A Critical Assessment of Basel II, Internal Ratings Based Approach Implementation in Emerging Markets
The Case of Turkey

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herewith permits the publication of the aforementioned dissertation without expressing any opinion on its views.

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List of Abbreviations

A-IRB:	Advanced Internal Rating Based approach
ALCO:	Asset and Liability Management Committee
AMA:	Advanced Measurement Approach
AIG:	Accord Implementation Group
Bafin:	Bundesaufsichtsamt für Finanzwesen
BCBS:	Basel Committee on Banking Supervision
BIS:	Bank for International Settlements
BRW:	Benchmark Risk Weights
BRSA:	Banking Regulation and Supervision Agency (BDDK)
CAS:	Country Assistance Strategy
CBOT:	Central Bank of Turkey
CCF:	Credit Conversion Factor
CCGRM:	Corporate Center Group Risk Management
CCR:	Counterparty Credit Risk
CDS:	Credit Default Swap
CEBS:	Committee for Banking Supervisors
CEPS:	Centre for European Policy Studies
CLO:	Collateralized Loan Obligations
CP:	Consultative Paper
CRD:	Capital Requirements Directive
CRE:	Commercial Real Estate
CRM:	Credit Risk Mitigant
CR&PM	Credit Ratings & Portfolio Management
CV:	Collateral Value
DD:	Distance to Default
EAD:	Exposure at Default
EAPB:	European Association of Public Banks
EBK:	Eidgenossische Banken Kommission
EC:	European Commission
ECA:	Export Credit Agency
EDF:	Expected Default Frequency
EL:	Expected Loss
EU:	European Union
EUR:	Euro currency
F-IRB:	Foundation Internal Rating Based approach
FSA:	Financial Services Authority
FRR:	Financial Restructuring & Recovery
GRC:	Group Risk Committee
GRM:	Group Risk Management
GRM QC:	Group Risk Management - Quantitative Consultancy
ICAAP:	Internal Capital Adequacy Process
ICBI:	International Centre for Business Information
IFF:	International Institute of Finance
IMF:	International Monetary Fund
IPRE:	Income-Producing Real Estate
IRB:	Internal Rating Based Approach
JDF:	Joint Default Frequency

LGD:	Loss Given Default
LPMG:	Loan Portfolio Management Group
M:	Effective Maturity
MaRisk:	Mindest Anforderungen an Risikomanagement
MKMV:	Moody's KMV (Kealhofer, Macquown and Vasicek, the three founders)
MRAAG:	Moodys Risk Advisor Advisory Group
NCV:	Net Collateral Value
OECD:	Organization for Economic Cooperation and Development
ONB:	Oesterreichische Nationalbank
PD:	Probability of Default
PEP:	Pre-Accession Economic Program
P-GRC:	Policy Group Risk Committee
PIT:	Point in Time
PM:	Portfolio Manager, Portfolio Management
PPP:	Public, Private Partnerships
PSE:	Public Sector Entity
QIS:	Quantitative Impact Study
QIS-TR:	Quantitative Impact Study-Turkey
RF:	RiskFrontier
RMP:	Risk Management Process
RMW:	The Risk Management Wholesale
RR:	Recovery Rate
RRE:	Residential Real Estate
SA:	Standardized Approach
SBU:	Strategic Business Units
SDIF:	Savings and Deposit Insurance Fund
SREP:	Supervisory Review and Evaluation Process
SPE:	Special Purpose Entity
SL:	Specialized Lending
SM:	Standard Method
SME:	Small- and Medium-sized Entity
SOFI:	State-owned Financial Institution
SSA:	Simplified Standardized Approach
S&P:	Standard & Poor's
TTC:	Through the Cycle
UCR:	Uniform Credit Rating
WCC:	Wholesale Credit Committee
WCRM:	Wholesale Clients Risk Management
WCS:	Wholesale Client Strategic Business Units
USD:	US Dollar currency
UT:	Under secretariat of Turkish Treasury
VAR:	Value At Risk

SECTION I: Introduction to the Thesis and the Environmental Analysis of Basel II from an Emerging Market Perspective

Chapter 1: The Objectives and Structure of the Thesis

1.1 Introduction

In June 2004, the Basel committee on Banking Supervision issued the "International Convergence of Capital Measurement and Capital Standards: a Revised Framework" known as the New Basel Capital Accord or more commonly as "Basel II." This thesis argues that lending institutions in Turkey should carefully consider the credit risk policy issues and recommendations raised by the Basel committee in the context of managing credit risk and allocation of capital. As detailed in the thesis, Basel II can serve Turkish banks in creation of a "new culture" of credit risk management, that will ultimately lead towards more economic allocation of capital and help them in gaining a competitive advantage, when sourcing customers and credit risk assets, and ultimately more value creation for the banks' shareholders.

The motivation to start with the thesis has come from the daily experiences during turbulent times when financial crisis broke out in 2000 and 2001. Bankers in Turkey had to survive in the thunderstorms of a twin crisis and still manage their credit risk portfolios, despite those unbearable "correlated tail events", resulting in capital erosions and decreased liquidity. Further experiences at a state owned bank in Turkey working with the International Monetary Fund (IMF) and the World Bank (the Bank) mission delegations under Article 4 surveillance regime, regarding bank restructuring and credit risk management issues, provided the thesis with depth and formed the backbone of the research. As capital is easily destroyed on the account of misallocation of capital, in other words the result of misruling and mispricing of credit risky instruments at banks, the credit risk management practices and capital adequacy ratios of Turkish banks are constantly reviewed by the World Bank and IMF authorities. In this sense, an implementation example of a Basel II related solution proposed in this thesis can influence the banking restructuring program initiated by World Bank for Turkey, but also on close watch by the IMF and the European Union's (EU) accession monitoring institutions.

Based on an observation period of almost a decade, it is important to mention here that the market and liquidity risks during financial crisis turned out to manifest themselves as *bottom line credit risks* as experienced in the twin crises of 2000 and 2001 in Turkey[1]. In particular, the transmission of fragility from the financial sector to non-financial sector stemmed from low capital ratios, inadequate risk-premiums, lack in diversification of financial claims and the over reliance on extensive credit risks carried on the books of the banks[2].

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[1] According to the Economist from 17th of May 2008, p. 12, the last sub-prime crisis also caused credit risks to become stuck on the books of investment banks and turned them into credit risks as well.

2 For detailed analysis of the economic theory of systemic risks, refer to Davis, E. P.: Debt, Financial Fragility and Systemic Risk, Oxford University Press, 2004, pp. 117- 146.

By nature, credit risks are challenging and demanding more specialist insight and hands on experience from risk managers and originators. Basel II challenges banks not only by the capital adequacy point of view, but merely by widened credit risk best practices that require more sophisticated knowledge and highest level of specialization, which cannot be met and replicated by the existing standards, knowledge and experience in the Turkish banking sector. A quote from the experts of McKinsey during the implementation of banking restructuring program of a public bank in Turkey provides another rationale for the thesis and sets the objectives to be fulfilled in the following sections. After many years of working to encounter the effects of financial crisis, McKinsey found that, "*simple errors and weak credit skills* made during origination and underwriting of loans combined with *politically instructed lending practices* put enormous pressure on banks' capital". In many emerging market economies including Turkey, deficient credit skills are still among the biggest weaknesses leading to systemic or financial crisis.

Without sounding patronizing over what is presented in the former bitter experiences in Turkey, more complex and trivial versions of credit crisis are experienced in the rest of the financial world today. With devastating speed, the crisis is spreading back into the heart of the most regulated parts of the financial system, causing justified concerns over the future financial stability of global banking systems[3]. Banks on the international arena also seem vulnerable to a "loss of memory" inside the credit markets. In recent years, a number of factors have come together that led to a significant relaxation of credit standards and to the repricing of credit risks globally. These factors include global growth, relatively low interest rates, higher demand of investors for high yield assets originated from the "sub-prime" obligors, resulting in the corrections of the "irregularities" during the summer of 2007. Today, the credit and liquidity squeeze are at the core of the global financial system, triggered by rising defaults at the major financial imperial institutions of the money centers in the world[4]. The events of summer 2007 have shown that more challenging risks remain and that the Basel I fortified banking system in Turkey is not equipped to deal effectively and efficiently with them.

In this regard, there have been efforts to speed up the implementation of the new Basel Accord rules, based on the argument that a new framework may help to make the capital base more relevant to the changing risk profile of banks and also serve to create incentives for better risk measurement and management. Basel II rules, based on the new tripartite pillar system, are able to improve its forerunner's shortcomings in an extensive way. However, Basel II is not yet in place in Turkey and the worries go beyond the "slow pace of implementation" towards suspension of Basel II until 2009. Regrettably, only a handful of Turkish banks will be able to implement the new framework by the end of 2009. Many of the small and medium sized banks will revert to the implementation of the Standard Approach, neglecting the advantages of incentives provided by the IRB, while relying on the shortcomings of the rating agencies in measuring the true risks of their corporate clients. The rest of the banks will follow up the road map of the regulator, which is approached more like "wait-and-see".

3 The Economist: A special report on the world economy, October 2007, p. 3.

4 United Nations: World Economic Situation and Prospects 2008, p.110.

Overall, Basel II is an improvement from the Basel I because the new rules cover a broader range of risks, align capital more tightly with the actual level of obligor and facility risks, reward institutions with more sophisticated risk management systems and demand more control on the level of securities that a bank holds. Consequently, the modeling of credit risks, application of Basel II Internal Rating Based Approaches (IRB) on sophisticated platforms, and management of credit portfolios by economic capital risk measure, will be the central issues of this thesis. Respectively, operational and market risk related issues, stemming from the first pillar of Basel II will be not in the research domain of this paper. Liquidity risk considerations under the second pillar of Basel II, where the world wide supervisors are now drawing up new rules at the moment, will also be outside the scope of this project.

1.2 Scope and Objectives of the Thesis

The thesis can be considered as a *"Road Map"* for all banks and the regulatory bodies in Turkey, that are still searching for pragmatic answers in managing and supervising the credit risks with the forthcoming Basel II and in the European Union's new capital adequacy framework. Under the new circumstances, Turkish banks are at a very critical stage in anticipation of the new rules, as the adoption of the new Basel Accord and the new prudential structures of the European Union (EU) are postponed for late 2009, which were originally scheduled for late 2006. Gaps in credit risk and portfolio management systems should be identified by comparing the requirements of Basel II with the current state of the Turkish banking sector. *The results of the thesis aim to empower the banks and regulatory bodies to take immediate corrective actions and develop good practices with respect to the implementation of IRB approaches.*

The thesis, in addition, seeks to *provide insights and guidance for the international best practices regarding credit risk management*. The implementation of Basel II standards at Turkish banks is of common interest to international market participants, which continue to increase shareholding at Turkish banks. A growing number of Turkish banks are primary targets for acquisition by foreign, mostly European bidders looking for good value propositions where sound risk management processes are in practice. This is one of the unique selling propositions for possible investors who want to initiate a block purchase for the majority shares. Respectively, a clear understanding of the new Basel Accord across different levels of the bank and the effective implementation of the Basel II are the prerequisites of a successful selling proposition.

Moreover, an increasing number of foreign investments into the Turkish financial markets builds more competitive pressures for the local banks. Turkish banks which will harvest the rewards from the significant investment towards sound risk management systems are those that adopt international best practice and are equally focused on enhancing the ongoing management and strategic direction of the business. The latter requires an equal focus on the economic capital and active portfolio management. While economic capital differs highly from regulatory capital, the same risk drivers such as "probability of default and loss given default", as well as additional portfolio considerations on migration and concentration risks provide the building blocks for the calculation of both. Inarguably, banks that adopt international best practices will reap the rewards of portfolio diversification, where risk-adjusted return measures will allow them to price risk optimally, while other banks will be ruled out of the competition. In fact, Pillar 2 considerations stress extensively on the additional

capital requirements that may apply to banks where portfolio concentration risks are not managed effectively in accordance with best practice and compared with other market participants.

As a result, the thesis will address the central issues in fivefold:

1. Identification of the key influences on the path to Basel II, such as roles of the Turkish regulatory bodies, EU directives as well as the supranational anchors, the World Bank and the International Monetary Fund (IMF). In this way, the thesis will set the scene for the current regulatory and institutional environment, which is critical for the successful implementation of the new Basel Accord.

   As stated by the Basel Committee, Basel II will apply to "all countries where international banks operate". However, the new rules may fail to take into account the differences in economic and financial structure of developing countries[5]. As such, the developing countries experience greater macro-economic volatilities under severe systemic risk constellations. Incidentally, identifying the key influences on the path to Basel II, such as the roles of the Turkish regulatory bodies that will prescribe national discretions under the existence of greater systemic risks, EU directives that set "benchmark standards" for the adoption of capital adequacy rules, and the role of the supranational anchors; the World Bank and the IMF with their surveillance and technical assistance programs are and should be of great concern to adapt the new Basel Capital Accord. The Basel committee's decentralized approach for the implementation has resulted in an uneven implementation and enforcement of its standards. For instance, the rigidity of US regulators in selecting some modules of Basel II or relaxing the capital adequacy rules in Japan by the Japanese regulators throughout the 1990s are bold examples, where those G10 countries may exercise meaningful influence over the formation of international regulatory norms. On the other hand, many developing countries and emerging market economies often do not have the discretion to pursue regulatory policies different than the ones conditioned by the IMF and World Bank through restructuring programs. With the effects and implementation of Basel II in mind, it is useful to step back and look to the practices of international financial bodies in establishing and promoting financial stability by exercising banking restructuring and regulatory standards. The application of these standards by the IMF and the World Bank and their incorporation into EU law shows their importance as international financial norms and the need for coordination of supervisory and regulatory practices, in order to ensure their efficient and equitable application to all countries. In this way, the thesis will set the scene for the current regulatory and institutional environment, which is critical for the successful implementation of the new Basel Accord.

2. Explanation of *the new Basel II rules* (widely perceived as being overly complex in the Turkish banking sector) and the discussion of the some practical implementation problems regarding the credit risks in Turkey, in particular the selection of framework proposed by Basel II, such as Standardized Approach versus Foundation Internal Rating Based Approach (F-IRB) or Advanced Internal Rating Based Approach (A-IRB). One of the early effects of the reform process has been to create

5 Alexander, K. / Dhumale R. / Eatwell, J.: Global Governance of Financial Systems – The International Regulation of Systemic Risk. Oxford: Oxford University Press, 2006, pp. 41-44.

a common risk language in the industry. Therefore, at first sight, it is easy to understate the degree of cultural and behavioral change required by the new coming rules and frameworks, at all levels of the organization from the board to individual lending officers.

3. Assessment of the *Impact of the New Basel Accord* on the Turkish banking sector on a quantitative level with tangible results. The thesis will first look closely at the quantitative impact studies conducted by the Basel committee globally as it forms a benchmark for a comparative analysis against the quantitative impact studies conducted by the Turkish regulatory body on Turkish banks. Furthermore, at a bank level, the thesis will present the effects of the quantitative studies at Halkbank as a case-study. It is critically important, in the context of the implementation, to highlight variations that may occur on individual bank level due to differences in risk assets, portfolio composition, risk appetite and business of the bank, compared to the rest of the economy and global markets.

4. Appraisal of an impact of the New Basel Accord rules on the Turkish banking sector on an organizational level. The thesis will present the *Redesign of the Risk Management organization* consistent with the BIS principles for best practices of Credit Risk Management. The new credit risk structure will represent a migration from a decentralized system to one with primarily centralized approval and decentralized monitoring and control. It is recognized that the successful transition from the current, classical risk management of the banks to the structure described in this thesis will require an actively managed change process. Those transition (change) management issues will be out of the scope of this thesis.

5. Presentation of methods, data foundation, systems and procedures for the actual implementation of Basel II. The focus, as mentioned, will exclusively be on credit risk measurement under IRB framework. Particularly, the thesis will propose to assist Turkish banks in delivering a suite of integrated solutions in two specific areas; Internal rating platform with counterparty- and transaction-based models and Credit Portfolio Management solutions. The proposed solutions will attempt to provide a comprehensive framework from credit rating all the way to portfolio credit assessment which permits the banks to strive for Basel II compliance, but also allowing them to take it further beyond Basel II compliance where economic (or portfolio) capital becomes a strategic measure to assess business decisions.

1.3 Structure of the Thesis

In line with the objectives as mentioned above, the thesis consists of six chapters constituted on four distinctive sectional topics. Under Section I, while Chapter 1 deals with the rationale and the setting of where the whole thesis intends to go, Chapter 2 aims to formulate the Basel II context from an emerging market perspective and contains an overview of the key drivers in Turkey and their relation to the implementation of the new Basel Accord. Having discussed the key actors of Basel II in Chapter 2, Section II explains the new capital rules of Basel II, and describes the key building blocks for measuring credit risks within the IRB frameworks; F-IRB and A-IRB are explained in Chapter 3. Chapter 4 reveals the results of Quantitative Impact Studies conducted by Basel II Committee, Turkish regulator on Turkish banks and on Halkbank as a case in point. In various sections of Chapter 4, comparative analysis and

the impact summaries can be found in detail, which assist in determining the preparedness of Turkish banks for Basel II compliance and cross checking with the roadmap of the regulatory body in Turkey. Following Chapter 4, that addresses quantitative aspects and main issues arising out of Basel II rules, Section III will start to formulate the imperatives to take actions. Chapter 5 will provide the implementation of Basel II on organizational level that includes the redesign of the credit risk management structures and processes at the banks. Chapter 6 will drill into the requirements of the new accord and present methodologies, data foundation processes, systems and procedures accepted as best practices by the international market participants, BIS Committee and the regulators worldwide. Section IV draws final conclusions from the concept and model laden works of the formerly presented chapters. At this stage, envisioning the contents of the thesis in a table will help the reader navigate through the research document easily. The research is crafted on five consecutive main sections and contemplated under the following chapters as depicted in Figure 1.1.

Figure 1.1: Interrelations of Sections and Chapters in the Dissertation

Narrative Sequence of the Dissertatiton	
Section I	**Introduction to the Thesis and the Environmental Analysis of Basel II from an Emerging Market Perspective** **Chapter 1: The Objectives and Structure of the Thesis** **Chapter 2: The Emergence of Basel II in Turkey**
Section II	**Analysis of the Basel II Accord and the Quantitative Impact Studies** **Chapter 3: The Path towards Basel II** **Chapter 4: Quantitative Impact Analysis of Basel II**
Section III	**THE IMPLEMENTATION OF THE BASEL II IRB APPROACHES** **Chapter 5: Implementing the Internal Ratings-Based Approach and Its Organizational Foundations** **Chapter 6: Implemention of Basel II IRB with Moody's KMVApproach**
Section IV	**Chapter 7: Synthesis and Conclusions**

Source: Author

1.4 Methodology and Literature Review

This research is based on two mutually completing approaches. To begin with, the evaluation is based on a survey of relevant literature starting from the basics of financial crisis, Basel II requirements down to the model validation issues. Further evaluations of the subject are elaborated inside the banking restructuring programs in Turkey where the new framework is in operation under an emerging market and under high level systemic risk conditions. The evaluation is also put into practice via the quantitative impact analysis globally and locally, including a case study of Halkbank.

Secondly, the "solution methodology" in Section III is formulated as a "what should be done" type of analysis, with consideration of the main issues presented in the first two sections of the thesis. The "way forward solution" is attained with intensive interviews with organizations, that apply best practice methods, and with notable documentation and workshops provided by Moody's KMV in London. The nature of work supported by Moody's KMV is depicted in the Appendix IV, Confirmation by MKMV and Appendix I, Bibliography, v. Reading Material, g) Moody's KMV - Published and Unpublished documentation.

1.4.1 Desk Research

The desk research with respect to the banking crisis was primarily based on the published and unpublished materials of BIS, IMF, IIF, the World Bank and the Moody's KMV. For the subjects like financial crisis, bank restructuring programs and the resulting regulatory frameworks, the library of IMF and the World Bank in Washington D.C is a massive source of key importance. For the works and studies related to the quantitative impact studies (QIS) at Halkbank, the thesis referred to the documents of the Halkbank, which were unique in nature. The materials of the Halkbank were obtained during the QIS intercourses with the BRSA and bank's risk management authorities. In the absence of the internal Halkbank documents, an explanation of the Basel II and its implementation would not have a material impact. Since the market is still in the preparation stage of the Basel II implementation, QIS results were analyzed in a descriptive way. For other Basel II related issues in Turkey, an important source is the web-site of the regulatory body in Turkey, namely BRSA, where all regulatory and supervisory documents are officially listed.

With respect to the Pillar 1 issues, the research was guided by the publications of EAPB (European Association of Public Banks), especially by the book of Schopmann, H. (et al): European banking and Financial Services Law, EAPB, 2004. The extent of written material was tremendous on the internet sites of the Financial Services Authority (FSA) in the UK, Bundesaufsichtsamt für Finanzwesen (Bafin) in Germany, Oesterreichische Nationalbank in Austria and Eidgenossische Banken Kommission (EBK) in Switzerland. Further material was collected from the Turkish Bankers Association and the Banking Regulation and Supervision Agency in Turkey, in particular for the analysis of the Basel II road map in Turkey, which is generally "revised and advised" by the IMF.

Similarly, regarding the Pillar 2 and 3 related issues, the thesis made use of the same web-sites as well as extensive presentations from various risk conferences, such as the ICBI Risk Minds, Geneva conference in December 2007 and Moody's KMV sponsored Credit Risk Practitioner conferences in 2007 and 2006. Many presentations and whitepapers provided by Moody's KMV have been used as references, in particular during the construction of Chapter 6.

1.4.2 Field Research

1.4.2.1 Institutional Information Sources

The preliminary information on structural factors for theorizing the credit risk management was sourced from the interviews with the authorities at IMF and the World Bank. Further interviews were held with the colleagues working at the regulatory and supervisory bodies like BRSA (Banking Regulation and Supervision Agency), SDIF (Savings and Deposit Insurance Fund), and the Central Bank of Turkey (CBOT). Additional data was gathered from the leading managers at Turkish private banks and the Undersecretariat of Turkish Treasury (UT), in charge of state banks, who had difficult times in surviving the thunderstorms of 2000 and 2001 crisis. Furthermore, a mass of information was collected from the "Basel II Working Committee" meeting reports held at the Turkish Banker's Association.

The descriptive field search for the regulatory issues regarding the Basel II and the analysis of the forthcoming EU capital adequacy directives was based on the author's participation at the workshops within the EAPB (European Association of Public Banks), which was established in Brussels representing the interests of public banks in the European Commission and Parliament. As with the forthcoming Basel II and the respective European provisions forming the EU capital requirements for banks, the public (state) banks will mostly be in jeopardy. In that respect, each new provision was discussed during the workshops arranged by the EAPB and the author had the chance to represent Turkey on these undertakings. Therefore, the workshop materials were a key source for the completion of QIS related chapter and sub-sections. Additionally, by obtaining further information about the core implementation issues by the public banks in EU from the EAPB and from its associated organizations, the author has identified on practical ground, how such issues have been tackled during the Capital Requirements Directive (CRD) transposition processes inside European Public Banks.

To describe the relevant and material aspects of the rating and portfolio management systems, extensive literature was requested from the Moody's KMV Modeling, Client Services and Research teams. The author spent a week in the London office of Moody's KMV attending workshops on different credit risk management solutions and individual discussion sessions with the company's experts.

1.4.2.2 Live Research Material Sources

The field research was also backed by the workshops and several conferences visited relating to the topic of the thesis, which were organized by the World Bank, the IMF, and the Institute of International Finance. Some of them are listed below. The author's close collaboration with the World Bank and IMF supervisors and the banking

community in Turkey resulted in a wide range of visual and documented material, based on the following workshops and conferences:

1. Risk Management in Turkey, held at Istanbul Trade University in 2001. This was one of the first conferences about risk management in Turkey, arranged by the author.
2. Assessing, Managing and Supervising Bank Risk, the World Bank, 20-24 May, 2002, Washington, D.C.
3. Risk Management Workshop, arranged by World Bank, 16-19 February, 2004, Colombia, USA.
4. The Role of State-owned Financial Institutions, Policy and Practice, Sixth Annual Financial Markets and Development Conference, 26-27 April, 2004, Washington, D.C.
5. IIF Basel Sessions 2004, Institute of International Finance (IIF), 6 July, 2004, Madrid.
6. International Monetary Fund (IMF), Board of Governors Annual Meeting, 2004, Washington, D.C.
7. Risk Management Workshop Turkey, "Implementing Risk-Based Capital", arranged by the World Bank, Banks Association of Turkey, Abn Amro Bank and Mercer Oliver Wyman, 9 – 11 February, 2005, Istanbul.
8. International Conference on Financial Stability & Implications of Basel II, Central Bank of Turkey, 16-18 May, 2005, Istanbul.
9. International Risk Management Forum, Active Finans, 8 March, 2007, Istanbul.

1.4.2.3 Interviews

In-person interviews were conducted to explore and understand the "uncovered" issues, with respect to difficulties in the implementation of Basel II. The authorities under the following institutions that were interviewed are as follows:

1. Supervisory Authorities:
   - Banking Regulatory and Supervisory Agency
   - Higher Audit Department of Turkish Prime Ministry
   - Central Bank of Turkey

2. Public (state) Banks:
   - Halkbank Risk Management and Structured Finance Departments
   - Ziraatbank Risk Management Department
   - Vakıfbank Risk Management Department

3. Private Banks:
   - Garanti Bank, Turkey
   - Akbank, Turkey
   - Tekfenbank, Turkey
   - ING Bank, Turkey
   - Abn Amro Bank, Turkey
   - Barclays Capital, London
   - WestLB, Turkey

4. Turkish Bankers Association

5. European Association of Public Banks (EAPB) for implementation issues from the perspective of public banks in Europe, interviews held in Belgium, Germany and Denmark.

6. The Institute of International Finance (IIF) for implementation issues at emerging markets

7. Moody's KMV, London

    - Credit Risk Specialist Group, specialized in the marketing and implementation of credit risk solutions
    - Modeling Services Group, specialized in the PD and LGD custom model development and the implementation of validation frameworks
    - Client Services Group, on the perspective of different bank needs and requirements in the European and Middle East Asia region.

Chapter 2: The Emergence of Basel II in Turkey

2.1 Introduction

The joint decision between the EU and Turkey to start with the negotiations leading to the full Turkish membership to the European Union will undoubtedly accelerate the integration of the Turkish business and financial sectors into the EU markets further. In turn, the EU accession is expected to present Turkey with more opportunities and challenges internally and externally.

In principle, the political preparedness has been firmly confirmed by the heads of state, but markets are driven by factors other than the political preparedness, such as the ambition and readiness to sustain competitive advantage efficiently and effectively in what is already a very competitive EU business environment.

It will require de-bottlenecking of the Turkish economy (through PPP's) further, both physically through the infrastructural investments in transportation, energy, etc and professionally through the adoption of business and financial standards common in the EU market place. Similar to the political journey to full "readiness", the Turkish banking sector has to continue making concerted efforts to be competitive in, contribute to and fully benefit from the "grand European opportunity". To exploit this "grand opportunity" on the way to European Monetary Integration, Turkey has to comply with the economic and financial acquis before the accession is conceivable. In this respect, Turkey needs to implement the necessary changes to its institutional and legal framework by the date of accession[6].

Turkey is basically required to adopt the acquis communautaire and the single market legislation to apparently make sufficient progress in sustaining a market economy, where the booming country should build a banking capacity to cope with competitive pressures within the EU[7]. This includes the continuation of Turkey adapting to the current EU rules on capital adequacy standards, commonly known as Capital Requirements Directive (CRD). On this point, it is sufficient to say that, on 26 June 2004 the Basel committee on Banking Supervision adopted a framework agreement on the international convergence of capital measurement and capital requirements, known as Basel II. The provisions in the new Directive (2006/48/EC) on the minimum capital requirements of credit institutions with Directive 2006/49/EEC form an equivalent to the provisions of the Basel framework agreement[8]. The new EU directive represents the practical transposition of the Basel framework agreement and its content is an equivalent to the Basel settlement[9]. With this directive, the EU directly aims to prevent 'dual accounting' and establish a 'transitional bridge' for international institutions that apply for Basel II - compliance. EU legislation will implement the Basel II convention

6 Arikan, H.: Turkey and the EU – An awkward candidate for EU membership. Hants: Ashgate, 2003, pp.15-17.

7 The term "acquis communautaire" refers to real and potential rights and obligations of the EU and its institutional framework of full-membership.

8 Directive 2006/48/EC of 14 June 2006 relating to the taking up and pursuit of the business of credit institutions (recast).

9 Proposal for a directive of the European Parliament and of the Council re-casting Directive 2000/12/EC of the European Parliament and of the Council of 20 March 2000 relating to the taking up and pursuit of the business of credit institutions dated from 4/8/2005.

in line with the new CRD on a wider scope[10]. The objective of the capital requirements is to have in place a comprehensive and risk-sensitive framework and to foster enhanced risk management among the financial institutions. This will maximize the effectiveness of the capital rules in ensuring the continuation of financial stability, the market confidence in financial institutions and the protection of consumers[11].

Similar to the EU, Turkey should implement the new Basel capital accord into its legislation via the transposition of CRD and cement the new risk sensitive capital rules on top of its Banking Directives, as long as the accession negotiations continue for full membership to the EU.

The new European CRD or Basel II objectives are in full harmony with the EU accession process and the Banking reforms introduced by the Bretton Woods Institutions in Turkey since early 2000's. In this context, the implementation of Basel II in Turkish financial sector is inherited through the EU accession programs and the Banking Sector Restructuring Reforms imposed by the supranational organizations such as the International Monetary Fund (IMF) and the World Bank (the Bank). Consequently, this chapter is dedicated to analyze the influence of each institution on the path to Basel II compliance in Turkey. It will start identifying the process of adopting the EU acquis and then detail the roles of supranational anchors and Turkish regulator. This chapter will conclude with the Banking Restructuring program, which governs the current business practices at banks in Turkey and the impact of Basel II on the current corporate banking practices and the financial stability in Turkey.

2.2 Role of the European Union's Standards

The adoption of the acquis goes back to the Helsinki Summit held on the 10-11 December 1999, where Turkey was recognized as a candidate country for EU membership. Respectively, the Turkish government announced its national program for the adoption of the EU acquis on 19 March 2001, which was submitted to the EU Commission on 26 March 2001[12].

The national program contained the Pre-Accession Economic Programs-PEP I and PEP II, covering the periods of 2002-2005. These pre-accession economic programs represented the framework for the implementation of Copenhagen economic criteria and the structural convergence benchmarks[13]. Accordingly, the EU started accession negotiations with Turkey on the 3 October 2005. The successful negotiations set the concrete principles, priorities and conditions for accession, which were documented in the "Revised Accession Partnership Agreement" dated as of January 2006. Turkey is widely expected to develop an inspiring plan that outlines the timetable and specific measures foreseen to address the accession partnership priorities. The revised accession partnership agreement provides the basis for a number of policy instruments, which will be used to assist the prospect state in the preparations for membership. In particular, the revised agreement will serve as the contractual basis for future political reforms and

10 For a detailed discussion about the transposition of the Basel II Accord into EU Legislation, refer to Consultation document of the U.K. Treasury dated from December 2003.

11 Press Release dated from 19/06/2006. At http://ec.europa.eu/internal_market/bank/regcapital/index_en.htm.

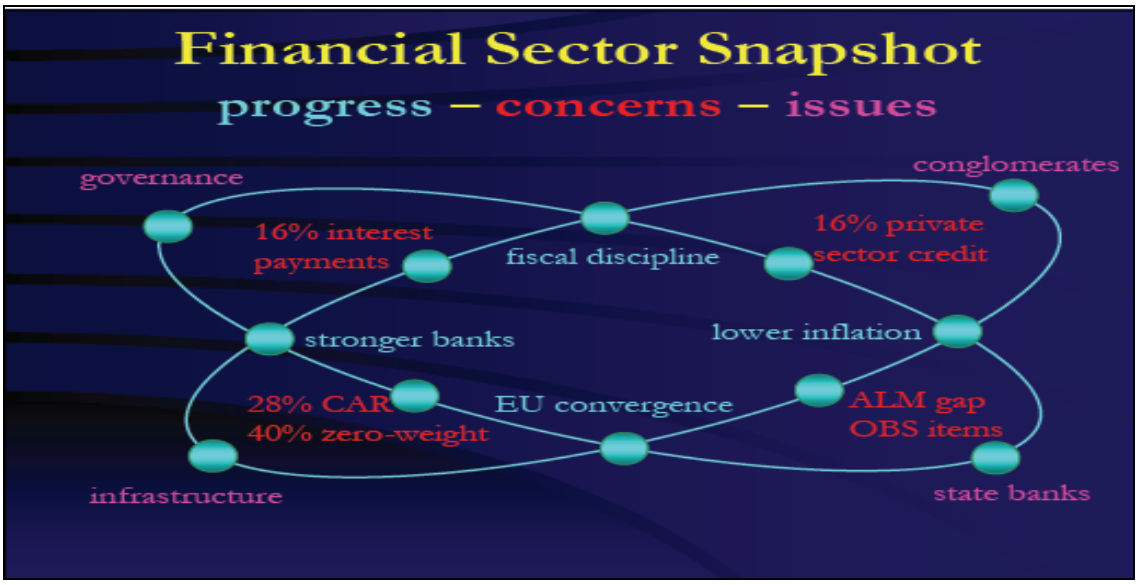
12 OECD Economic Surveys Turkey, 2002, p. 39.

13 Republic of Turkey, Pre- Accession Economic Program, 2002, pp. 1- 96.

yardstick against which to measure future progress. The priorities listed in this agreement have been selected on the basis of realism, in which case Turkey is widely expected to fully execute and bring the reforms substantially forward over the next few years. A fundamental distinction is made between short-term priorities, which are expected to be achieved within one to two years. On the other hand, medium-term priorities are expected to be accomplished by three to four years. The priorities not only aim to reform the current legislation, but also ensure the successful implementation of regulations thereof. Consequently, Turkey will have to address all predominant issues identified in the revised accord in its progress report, in order to guarantee its irreversibility and ensure its uniform implementation throughout the country at all levels of the administration. It is important that Turkey fulfils the commitments of legislative approximation and implementation of the acquis in accordance with the commitments made under the association agreement, customs union and other related decisions of the EC-Turkey Association Council[14].

A progress report by the World Bank summarizes the progress, concerns and issues within the Turkish Financial Sector, as follows:

Figure 2.1: Financial Sector Snapshot in Turkey[15]



Source: World Bank Risk Management Workshop, Istanbul, 2005

Therefore, the most striking short-term objectives concerning the accession and the thesis are the fulfillment of the economic criteria, regarding the continuation with the:

1. Implementation of the current structural reform programs agreed with the IMF and the World Bank.
2. Completion of the implementation of the financial sector reform, in particular the alignment of prudential and transparency regulations and their surveillance on international standards.
3. Safeguarding the independence of market regulatory authorities.

14 Official Journal of the European Union, Council Decision of 23 January 2006, on the principles, priorities and conditions contained in the Accession Partnership with Turkey (2006/35/EC).

15 Fratzscher, O., World Bank, Risk Management Workshop, Istanbul, 2005.

4. Acceleration of the privatization of state-owned entities, in particular of state-owned banks, taking into account the social component.
5. Continuation with market liberalization, and price reforms.
6. Continuation of the economic dialogue with the EU, in particular in the framework of the pre-accession fiscal surveillance procedures, with emphasis on appropriate measures to achieve macro-economic stability, predictability and on the implementation of structural reforms.

Respectively, the ability to assume the obligations of membership depends on the adoption of the necessary implementation measures under the new banking laws. As established in the revised agreement, the "new comer" should also ensure a consistent progress towards the implementation of the roadmap for the new capital requirements framework regarding credit institutions and investment management firms[16].

The EU candidate should strengthen prudential and supervisory standards in the non-bank financial sector by rationalizing the supervisory structures where necessary. This is equally true for the implementation of economic criteria under medium-term priorities. *Turkey should dutifully fulfill in three to four years time the economic criteria, which constantly requires the completion of the privatization programs and the substantial progress towards the implementation of the new capital requirements framework, in line with the Turkish Banking Regulatory and Supervisory Agency's (BRSA) detailed Basel II roadmap*[17]. On the side of the prudential regulation, Basel II is expected to nurture the development of a culture of risk management, where the supervisory role transitions from "ratio surveillance" (checking bank positions against predetermined prudential ratios) to a risk-focused supervision (examining the bank's risk management process).

Conclusively, Basel II is the prerequisite for Turkey's accession to the EU and hence to the EU's Banking and Supervisory structures. Even though the BRSA and Turkish Bankers Association with the participation of several banks in Turkey carved out a "Basel II Roadmap", most of the directives and material guidelines are missing on account of the "ownership" concern for the implementation of forthcoming capital adequacy framework in Turkey. This may be the result of missing political sponsorship and the uncertainties around the implementation of the new coming accord, where the interests of the bankers and the real sectors may clash. In fact, it appears to be a strategic issue, starting from the overall governance to the establishment of subsequent standards to improve the overall market discipline, which require long term solutions and decisive actions. Both in the past and present, such long term solutions and decisive actions are encouraged and sometimes enforced by the Bretton Woods Institutions, acting as "Supranational Anchors" in Turkey.

Not surprisingly, EU widely expects to ensure the realistic solution for the deeply rooted financial problems in the technical *implementation of institutional reforms embedded in the IMF programs*. In addition, EU indirectly aims to facilitate the potential benefits of the new accord namely the "reduction in the probability and severity of banking crisis" in the accession of Turkey. Even though the road for full membership is an open ended question for Turkey, the EU offers a priceless

16 Turkey has adopted a roadmap for Basel II, which will be explained in the forthcoming chapters.

17 Official Journal of the European Union L22/34-35, 26.1.2006, p. 13.

opportunity for domestic governments to "lock in" their reforms and to increase the credibility of the distant country on the global arena[18]. As a result, the implementation of Basel II should be perceived from this perspective.

In general, the threat to country's financial stability is two-fold; macro-economic volatility and the strength of the financial system. While weak financial systems undermine the potent effectiveness of monetary policy, substantial macro-economic imbalances often lead to financial system fragility. Basel II aims to improve the built-in strength of financial systems through effective risk management processes, enhanced corporate governance, banking supervision and market disclosure, but the impact of such transition can only be long-lasting with reduced macro-economic volatility in the country. In that regard, it is critical to analyze the role of the supranational anchors, the World Bank and IMF in the next section.

2.3 Role of the IMF and the World Bank as Supranational Anchors

Two mainstream standards are working at cross purposes in mutually reinforcing form, namely the EU and the IMF/World Bank standards depicted in form of "conditionality and performance benchmarks" in Turkey. The reinforcement of "making substantial progress towards the implementation of the new capital requirements framework, in line with the Banking Regulatory and Supervisory Agency's (BRSA) detailed roadmap" as a short- and long- run benchmark condition is a very significant and material issue. This predominant issue alone presents the Turkish standard setters and the banks with serious dilemmas and challenges. The EU, in addition put a ceiling to the Turkish financial system for the implementation of IMF Stand-By Agreements as prerequisite for the accession to the EU. Unfortunately, the absence of political commitment to create safe and sound banking systems in transitional economies results in "governance vacuums" and crisis prone financial institutions. The prompt resolution of the governance mechanisms and the quest for effective and efficient standards calls for the immediate interventions of the "Supranational Anchors" like International Monetary Fund (IMF) or the World Bank (the Bank). The Supranational Anchors also ensure the implementation of the current financial sector reforms agreed with IMF under Article IV consultations, and the exercise of "Country Assistance Strategies" (CAS) of the Bank. Turkey is one of the heavy users of the quotas of the IMF/World Bank facilities as depicted below:

Table 2.1: Outstanding Exposure to Supranational Organizations

External Debt and Assets ($ million):	2002	2003	2004	2005	2006	2007	2008f
International Financial Institutions	30860	33412	32329	24896	22164	19603	18733
IMF	22884	24997	21507	14646	10798	8112	7379
IBRD	5416	5225	6161	5857	6738	6818	6692
Other multinational creditors	2560	3210	4661	4393	4627	4672	4662

Source: IIF Database: Turkey, March 2007 Report

Financial integration into the European banking and supervisory standards requires more powerful, external anchors namely the IMF and World Bank through Stand-By Agreements under Article 4 Consultation and the implementation of "Country Assistance Strategies (CAS)" programs for the completion of the Accession Fiscal

18 Arikan, H.: Turkey and the EU, 2003, p.240.

Surveillance Procedures of the EU, respectively[19]. Both institutions played substantial roles in rebooting the Turkish economy up to the global standards since the occurrence of twin financial crisis in November 2000 and in February 2001. During the preparation of the Banking Restructuring Program in 2001, the World Bank and the IMF co-operated together in factoring out Turkey's EU aspirations into their analytical works. Especially the Bank was quite overcautious about the changes in the legislative and administrative areas before the implementation, which should be in harmony with the existing rules and regulations of the EU. During the implementation of banking structural reforms, EU Experts have been approached by World Bank authorities and consulted in the discussions[20]. The challenge was and will always be to combine the systemic stability efforts with prudential regulations and supervisory skills of global standards that promote the market discipline on a sound banking system in Turkey[21]. Today, those challenges should be flanked with the norms of Basel II and the CRD in Turkey in the forefront of EU Accession. There is not any doubt that, becoming an internationally accepted counterpart in the EU, Turkey should be built on a stable macroeconomic environment, smoothly functioning financial markets and well managed financial institutions within a sound framework of prudential supervision, which are the prerequisites of Basel II.

2.4 Initial Progress towards Basel II: Banking Sector Restructuring Program

The re-structuring of the Turkish banking system was set as the first priority, in terms of policy implementation by the double anchors. The objectives of the Banking Sector Reform Program are to upgrade the legal and regulatory framework of the banking sector, in order to bring it in line with the Basel II accord and EU standards[22]. The new reforms should yield in operating efficiency, governance quality, and financial strength of the Turkish banking sector by carrying out the necessary financial and operational restructuring, on both the state owned and privately held banks in the system. Historically, the Turkish banking sector has suffered from a weak legal and regulatory framework, and considerable regulatory forbearance, especially in the areas of loan loss provisioning, connected and insider lending extendable up to the "rogue banking practices". Indiscriminate and liberal licensing of banks without enforcement of proper ownership and governance standards has led to a proliferation of "one table-one casa" banks in Turkey. The existence of those practices created limited capacity or commitment to the development of a responsible banking culture. In the absence of effective regulations and clear mechanisms of enforcements, those banks were not concerned much about creditworthiness and good risk management. Large number of such insolvent, crisis prone and capital deficient banks led the entire economy to the twin banking crisis in Turkey in 2000 and 2001, which were the result of systemic risk created by these banks.

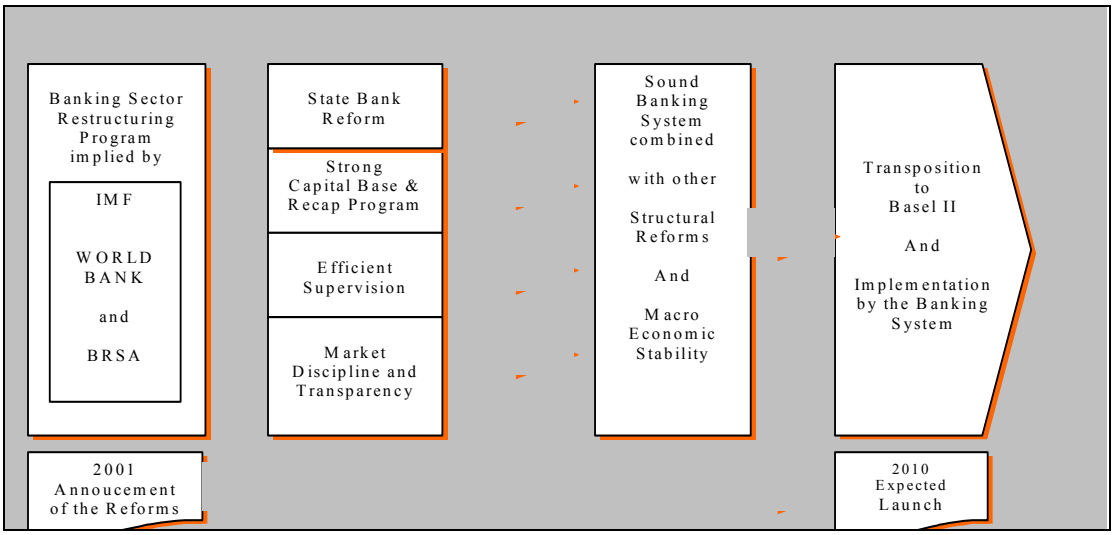
19 Rubin, B. / Öniş, Z.: The Turkish Economy in Crisis. London: Frank Cas, 2003, P. 192.

20 The World Bank in Turkey, 1993-2004 (2006, p. 15)

21 Masciandaro, D.: Handbook of Central Banking and Financial Authorities, 2005, p.450.

22 Country Assistance Strategy Progress Report of the World Bank Group (2001, Annex B12, pp. 1- 4).

Figure 2.2: Turkish Banking Restructuring Strategy[23]



Source: Pazarbasıoglu (2005, p.163), revised by the author

As depicted in the above figure, the transformation of the financial system towards stability and efficiency started with the Banking Restructuring Program, as banks are the main intermediary channeling funds and restoring public confidence in the system. The IMF and the World Bank mandated Turkish policy makers to establish an independent institution called Banking Regulatory and Supervisory Agency (BRSA) in 2000. In May 2001, in the aftermath of the crisis, the young BRSA announced the Banking Sector Restructuring Program. The program aims to eliminate all factors that may result in a systemic crisis in Turkey and upgrade the standards to EU level as documented in its "Basel II Road map".

Clearly, the core content of the program is in full harmony with the "pillars of the Basel II" framework with one exception: the state bank reform itself. The road to Basel II may take at least a decade since the first inception of the banking reforms. Besides, all supervisory standards either in form of Basel II or CRD, recognize that a set of preconditions (outside the scope of those standards) must be met to allow effective implementation of the standards. The necessary preconditions on the way to Basel II are highly demanding: sound and sustainable macroeconomic policies, a well developed public standards infrastructure (IAS, SOX, corporate governance, legal framework), restructuring of the state owned banks and the procedures for resolving problem institutions combined with huge restructuring costs[24].

Naturally, the IMF, the World Bank and EU institutions will have crucial roles in shaping the macro environment that Basel II framework will take effect. Especially the IMF will serve as leading anchor, in terms of encouraging decisiveness of policy makers to continue on long-term economic policies, structural reforms and the increasing credibility of the country's institutions[25].

23 Pazarbasıoglu (2005, p. 163), some amendments to the diagram has been made by the author.

24 The World Bank & IMF, Financial Sector Assessment Handbook , 2005, p. 87.

25 The Banker , IMF Supplement ,"interview with the former president of Central Bank of Turkey", 2004, p.14.

The "Banking Restructuring Program" and the "Roadmap for Implementation of Basel II" concerted by the BRSA will be the leading contributors for the integration of the banking system into the European banking system. A strong, vibrant banking sector will contribute to growth and provide domestic financial stability. Transposition of the Turkish regulatory and supervisory legislation to the EU Capital Requirements Directive with parallel implementation is of the essence. It will further strengthen the role of the Turkish financial banking sector as counterparty and partner in the international financial markets. It is important to recognize that, whether banks are opting for the Standardized Approach (SA) or the Internal Ratings Based (IRB) Approach, the underlying internal process at the risk management departments should go beyond compliance with the Basel II framework. The key importance is the creation of a comprehensive integrated Enterprise Risk Management (ERM) mindset and framework, unique for each individual bank, which will be at the core of its strategic ambitions and tactical, value creating execution thereof, supported by properly identifying, measuring, managing and pricing the many different dimensions of risk: credit (including country risks), market, liquidity, operational, interest rate, business and finally strategic. ERM is not an IT-driven, text-book "quick fix". Notwithstanding input from data and model support, its Charter (i.e. its organization and processes) and its common metric denominator, Economic Capital (EC), are ultimately based on the notion that there is not any substitute for sound judgment and accountability thereon by a bank's management. As former Chairman of ABN Amro Bank, Mr. Jan Kalff stated during the transition to Basel II: "Regulatory Standards should be our minimums with respect to managing risks". Before discussing the credit risk management best practices (which will be the focus in following chapters), it is worth providing background to the missing effective corporate banking practices at Turkish banks to date. On the path to Basel II, the prerequisite for the EU accession, banks will be required by the BRSA to significantly improve their corporate banking practices.

2.5 Basel II: Impact on the Corporate Banking Practices at Turkish Banks

Since the beginning of 2003, Turkish banks reorganized their structures, mainly driven by the BRSA structural banking reforms as well as international best practices that form the core of Basel II accord. Surviving banks following the twin crisis created "Portfolio Management" and "Risk Management" divisions, but the practice at Turkish banks still remains to be far away from what is intended by the Basel II framework as well as international best practice.

Even though there are "scoring" systems based on "punctuation" of several ratios rather than full fledge econometric models, the existing scoring systems are not able to price the commercial credit undertaken by corporate bankers. In other words, credit is generously given without proper quantification of risks associated with the customer and hence the relationship to the bank customer is not judged on the basis of risk versus return or assuming "value creation". Consequently, the calculation of product profitability is absent when the benefit versus cost of servicing the credit lines is not assessed precisely. Speculative grade domestic customers are still approved by bankers without considering the RAROC (Risk Adjusted Return on Capital) of the transaction, which will inform on the risk contribution of that single facility to the existing portfolio of the bank.

In addition, the deals are not infiltrated by the portfolio management group and diversification/concentration effects of asset types are not reported in any way. Expected Losses (EL) and Unexpected Losses (UL) are still concepts that should be inherited from the implementation of Basel II for better credit risk and portfolio management at Turkish banks. Any credit risk management system, which is not integrated into a value based management, will result in inefficient, "default laden" transactions with bitter consequences in terms of risk-taking attitudes[26].

There are more than enough reasons to the effective and efficient credit risk management practices imposed by Basel II. According to Stiglitz, the institutional developments, transformations in credit culture and creation of regulatory structures which reduce the likelihood of excessive risk-taking has proven more intractable and difficult than finding short-term solutions, such as recapitalizing the banking system[27]. Credit- and risk structuring are a cultural issue, which start with the mission statement of the bank and is deeply rooted in the transparent system adopted by the bank's top management. The risk management culture of a bank accumulates throughout the time and culture shapes individuals' thoughts about risk, reward and opportunity[28]. There is not any doubt that the credit culture should be creatively constructed by the internal resources of the bank, and reinforced by the structural reforms initiated by the leading supervisory and regulatory bodies in Turkey.

There is much to be done with respect to the structuring and credit risk mitigation issues in the banking sector. The ordinary account officer's activity is limited to granting working capital facilities and corporate guarantees. More structured products such as project finance, structured trade finance and products with cross border lending facilities remain still as "not available" to the market participants. This unfortunate "tight product scope" is directly affecting banks' competitive position in actively managing their portfolios and improving returns.

While the product scope remains to be limited in Turkey, banks are increasing their focus in the SME lending segment, which may prove very profitable for well-managed banks. Currently, banks seem to see real growth opportunities in the SME lending segment. In parallel, although SME's have access to a variety of financing sources, including leasing, factoring and trade credit, they rely heavily on bank financing. Nevertheless, several constraints continue to hinder SME financing in line with firms' natural growth cycle. According to banks, the lack of equity, the high credit risk, the paucity of collateral and poor information about the firms constitute the main obstacles to granting finance to SMEs. Other constraints that play a role in the assessment of loan applications, such as poor entrepreneurial capacity, business performance and uncertain development prospects, are felt to be equally important in granting loans to this segment of the credit market.

Faced with implementing the requirements of Basel II worldwide and the new Capital Requirements Directive in the EU and in Turkey, banks are widely expected to require even more and better quality information from their customers. Hence, lending to

26 Altman E.I/ Caouette, J.B. /, Naratyanan P.: Managing Credit Risk, 1998, p. 29.

27 Stiglitz, J.: The Rebel within, selected speeches by Joseph Stiglitz. London: Anthem Press, 2001, p. 31.

28 Lindsay, Stace: Culture, Mental Models, and National Prosperity. In Huntington S., Harrison, L. E. (eds): Culture Matters, How Values Shape Human Progress, 2000, p. 282.

SME's will require a large amount of financial and strategic information in the spirit of reducing the critical information asymmetries. The new regulatory rules have introduced more stringent requirements to counter the growing concern of risks at the national and global levels. This step does not imply partial credit rationing. Instead, it basically requires banks to view their business in a more sophisticated and risk-sensitive manner, particularly in the SME lending business.

High competition results in the increased importance of better risk assessment methods and tools for the second-tier SME clients, and the need for preserving the bank's capital with the right compensation at the level of risky portfolios. Equally, SME's need to understand these regulatory changes as their financing conditions will be impacted to a certain degree – not necessarily by reducing their credit facilities - but by rendering the whole process more risk-sensitive and contingent upon the individual quality of the borrowers.

In such complex environment, credit risk measurement and management of Basel II challenges the banks with more sophisticated knowledge, technology, IT and related credit risk management systems, which cannot be met by the existing skills, expertise, culture and processes in the Turkish banking sector at present. The following chapters will explore ways to raise the bar in the current operating environment, as far as the credit risk practitioners and regulating and supervising bodies are concerned.

2.6 Basel II: Impact on the Financial Stability of Turkey

The World Bank and the IMF pay special attention to support Turkey's preparation for EU membership and to synergetic work closely with the EU institutions in this process. For example, in the banking sector reforms, prestigious programs are designed to ensure that Turkey's banking supervision framework complies with both EU standards and Basel II norms[29]. In this sense, the new capital adequacy framework (Basel II) is perceived as the "Second Generation Financial System Development" in case of Turkey, if and when implemented as an indispensable part of a financial stability and development program arranged by the supranational anchors. Its emphasis on capital adequacy and its encouragement of strong risk management practices regardless of the regulatory capital instructions support the financial stability mandate of the central bankers and the regulatory authority in Turkey. Nevertheless, the accomplishment of the new framework relies naturally on the banking supervisory agency's intellectual capability to build enough capacity for the adoption of EU directives and Basel II requirements. Hence, the World Bank oversees the implementation of Basel II with great care and reports the ongoing developments in its Country Assistance Strategy Reports progressively.

With the introduction of the new generation of rules, the supranational anchors expect the development of the credit markets, due to improvements in accounting, auditing, development of credit information systems, new collateral regime as well as the development of more specialized instruments, for instance mortgages[30].

29 Country Assistance Strategy Report (2003, p. 31)

30 Country Assistance Development Report, Annex A1, 2005, p 12.

Basel II is the new name of the financial stability efforts in Turkey, where its implementation should enhance the recent development of a strong financial sector infrastructure, including effective risk-focused banking supervision. A second major contribution of Basel II to financial stability is that it will lead the financial institutions to deepen and accelerate their efforts to improve the evaluation, quantification, and disclosure of risk. This very basic structural precondition of Basel II in turn facilitates and supports the ongoing World Bank and IMF efforts in maintaining the financial stability[31].According to the former Chairman of the Basel committee, Mr. Jaime Caruana, "the Basel II is fundamentally about better risk management and corporate governance on the part of banks, as well as improved banking supervision and greater transparency. It is also about increasing the stability of the global financial system, to the benefit not only of banks, but also consumers and businesses"[32]. Similarly, the Institute of International Finance (IIF), the global association of financial institutions, welcomes the progress made by the Basel committee on Banking Supervision towards finalizing the new Basel accord and verifies the joint statements made by the former Chairman of Basel committee in its manifesto for the "Implementation of Basel II" as follows:

"The New Accord can play a generously fundamental role in strengthening financial systems in emerging markets, primarily by providing effective incentives to the development of more sophisticated and technically sound risk management practices. A careful approach is needed for Basel II implementations in emerging markets, in particular regarding the necessary pre-conditions of supervisory resources, regulation and availability of technology, but the move toward the new framework is an important objective"[33]. This core attribute of Basel II, which has a different meaning for the crisis prone emerging markets, is usually neglected by the more advanced economies. This instance is explicitly rephrased and inserted into the core document as, "The fundamental objective of the Basel committee's work (BCBS) has been to develop a framework, which would further strengthen the soundness and stability of the international banking system"[34]. "The worldwide accord should continue to promote safety and soundness in the financial system and the new framework should at least maintain the current overall level of capital in the interconnected system"[35]. As such, one can argue that the G-10 central banking and supervisory authorities have become more risk- and capital-conscience by calibrating the "single capital standard" with mutually reinforcing "tripartite pillars" system. The safety and soundness objectives cannot be achieved solely through minimalist regulatory capital requirements. The Basel Committee emphasizes that the new accord consists of three mutually reinforcing pillars.

31 IMF Public Information Notice (PIN) No. 05/154, IMF Executive Board Discusses Implications of the New Basel Capital Adequacy Framework for Banks ("Basel II"), November 7, 2005.

32 Remarks of Jaime Caruana, Governor of the Bank of Spain, former Chairman of the Basel Committee on Banking Supervision at the international conference on Financial Stability and Implications of Basel II, Istanbul, 6 May 2005, pp. 1-16.

33 IIF: The Implementation of Basel II, A Report of the Steering Committee on Regulatory Capital, 2005, p. 14.

34 Basel Committee on Banking Supervision (BCBS), International Convergence of Capital Measurement and Capital Standards, a Revised Framework, June 2004, Art. 4, p. 2. A superb article about the Basel II and Financial Stability is provided at conference notes of Mr. W. L. Rutledge in Istanbul, being in charge of Bank Supervision Group of FED.

35 BCBS: Consultative Document, Overview of the New Basel Capital Accord, 2001, p. 6.

2.7 Closing Remarks

This chapter intended to highlight the importance of Basel II as part of Turkey's accession to the EU and its banking and supervisory structures. However, there still remains to be an ownership issue for the implementation of forthcoming capital adequacy framework in Turkey. In the past and present, such long term implementation related actions are encouraged and sometimes enforced by the "Supranational Anchors" in Turkey. As supranational anchors continue to be pivotal, EU not surprisingly, expects to ensure the realistic solution to the deeply rooted financial problems in the pragmatic execution of institutional reforms, embedded in the IMF programs and the World Bank initiatives. The challenge was and will always be to combine the systemic stability efforts with prudential regulations and supervisory skills of global standards that promote the market discipline on a sound banking system in Turkey. In addition to this, there is today greater understanding and consensus that in order to carry out successful macroeconomic program, there must be a sound financial system, especially a strong banking system[36]. Today, those challenges are to be flanked with the norms of Basel II and the CRD in Turkey in the forefront of EU Accession. Respectively, the core content of the Turkish banking restructuring program was in full harmony with the "pillars of the Basel II" framework with one exception: the state bank reform. Although the banking restructuring program was a strong progress towards safety and soundness of the financial system, there is much to be done on the path to Basel II. Credit- and risk structuring are cultural issues and there is not any doubt that the credit culture should be reinforced by the structural reforms initiated by the leading supervisory and regulatory bodies in Turkey. In addition, Basel II is designed to be about better risk management and corporate governance on the part of banks, as well as improved banking supervision and greater transparency. Moreover, the stability of the financial system is increased to the benefit not only of banks, but also of consumers and the businesses world.

Consequently, Basel II aims to achieve the safety and soundness objectives not solely through minimalist regulatory capital requirements, but more through a supervisory framework, that allows effective incentives to the development of more sophisticated and technically sound risk management practices and market disclosure. In the next chapter, the thesis will explain and analyze the implications of the new framework on the Turkish banking system and its supervisory bodies.

36 Frenkel. J.: Remarks to Financial Crisis: What Have We Learned From Theory and Experience?, 1999, p. 65.

SECTION II: Analysis of the Basel II Accord and the Quantitative Impact Studies

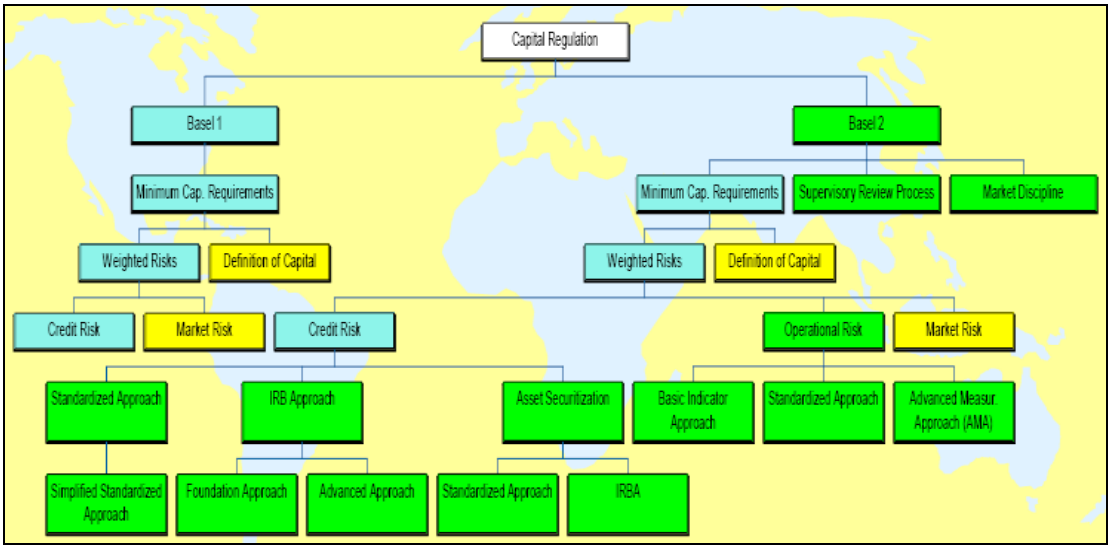
Chapter 3: The Path towards Basel II

3.1 Introduction

Chapter 2 discussed the presence of "double anchors" with respect to the establishment of a sound and safe financial system in Turkey, a well known "must" covenant to be an integral part of the European Financial System. Chapter 2 also reviewed the initial progress that has been made and the further impact expected with the Basel II on the Turkish corporate banking practices and the overall financial stability of the country. The Basel committee implicitly stresses the importance of "*maintaining financial stability*" by marking it as one of the most material objectives of the New Accord. These financial stability objectives cannot be achieved solely through minimalist regulatory capital requirements. The Committee recognizes that the ultimate responsibility for managing risks and ensuring that economic capital is held at a firmer level consistent with a bank's actual risk profile, remains with that of bank's management. At the same time, the tireless Committee pursues to promote the adoption of stronger risk management practices through the Basel II three pillars, while maintaining the competitive equality among the international banks.

Based on this continuum, this chapter will review and elaborate the three mutually reinforcing pillars; 1) minimum capital requirements, 2) supervisory review and 3) market discipline. Taken together, the combination of mutually reinforcing pillars contributes to a higher level of safety and soundness in the financial system.

Figure 3.1: The New and Old Capital Regulation Structure



Source: Majnoni, G.: Financial Sector Issues and Analysis Workshop, World Bank, Washington, D.C., Oct. 2003.

As depicted in Figure 3.1, the new accord challenges Basel I in many non-complementary areas. First of all, the new tripartite pillar system has to keep the average minimum capital requirement at the historical level set by Basel I, while allowing a set of incentives for banks to move towards more sophisticated risk

management requirements. Furthermore, more features of capital requirement calculations are provided in a multiple compendium of practical approaches.

The architects of the new framework retained the key elements of the 1988 capital adequacy framework, commonly referred as Basel I, by not changing the famous 8% benchmark of the risk-weighted assets and the basic structure of the 1996 Market Risk Amendment with respect to the market risks and to the definition of eligible capital items[37]. While the key elements of Basel I are retained, the new framework will undoubtedly lead to the preservation of economic capital inside the core financial systems of those countries adopting the new framework through its more risk sensitive and generous incentives than its predecessor. This will considerably lead to the prevention of financial fragility and contribute more to the soundness and strength of the international financial system. The new accord will prove itself not only at the level of calculating simple capital adequacy ratios, but more on the future level of building sound financial systems. It is evident that Basel II cannot promise the avoidance of the future financial crisis in the world, but it will prove to be much more resilient and defensive against a financial crisis as a market-led system. Before drilling into the objectives and requirements of Basel II, it is worthwhile to look into the limitations of Basel I in the next sub-section.

3.2 Limitations of Basel I

The Basel capital accord has now been in existence for almost two decades. Regrettably, rapid revolution in the financial industry has exposed some weaknesses in the first accord. The most significant of these is the limited ability of the first accord to assess capital adequacy in relation to the "true risks" of the obligors. Despite its many achievements until 1997, it became clear that Basel I required a radical overhaul if prudential regulation was to maintain its relevance and effectiveness in the face of accelerating market turbulence, innovations and the development of new risk management techniques. According to Hirszowicz, in the face of continuous efforts of amendments, the original accord is not "time adequate" to the latest developments and challenges of credit risks[38]. In point of fact, the original accord was not only time-inadequate; it was also "system-inadequate". To highlight some global examples, in the years that followed the Basel I, 133 of the 181 members of the IMF suffered serious banking sector problems[39]. Even though the objective of sustaining a definite level playing field was achieved to a certain degree and the international banks were encouraged to add substantial new capital to the global banking system, the distortions to the operational conditions were unavoidable.

The first accord was revolutionary in the sense that it was relating a bank's capital to the "perceived risk" of the bank's risk proliferation. It also incorporated off-balance sheet exposures and the quantification of risks associated with these transactions. In addition, it introduced the concept of "risk weighted assets" with the weighting of the

37 BCBS: International Convergence of Capital Measurement and Capital Standards: Comprehensive Version : June 2006, paragraphs 4-6.

38 Pls. refer to Hirszowicz (2003, p. 153) for a complete framework and the role of Banking Regulations inside the Swiss Banking Policy.

39 Gup, B. E. (ed.): The New Basel Accord, 2004, p. 4. Also see Rixtel, A. (et al) for the role of Basel I against the background of the banking crisis in Japan, p. 400.

risky assets according to specific "risk buckets". The risk buckets or weights were used to reflect the "risk composition of a bank's portfolio" for different classes of assets. The "risk weights" were comprised of four categories; 1) No Risk (0% weighting), 2) Low Risk (20% weighting), 3) Medium Risk (50% weighting) and 4) Full Risk (100% weighting).

Asset types were classified on the basis of three dimensions; 1) Liquidity (the asset classification started from the most liquid assets such as cash to the least liquid one like real estate), 2) Debtor type (governments, central banks, public entities, banks and corporations), and 3) Debtor's country of residence (OECD or non-OECD)[40].

The first accord used a formula to relate the regulatory capital to risk weighted assets, described as follows[41]:

$$\mathbf{CR = RC / \sum Ai * \omega i \geq 8\%}$$

Where,

CR: Capital Ratio
RC: Regulatory Capital split into two categories, Tier 1 capital and Tier 2 supplementary capital
Ai: i-th Asset
ωi: Risk Weight of the i-th asset.

As such, the first accord was exclusively a set of minimum quantitative guidelines. According to the simple formula constructed as above, the banks were basically preserving capital of not less than 8 percent of their risk-weighted assets. The "bucket system" was applied to all types of banks, which was severely criticized on account of "one-size-fits-all" problem. The arbitrary nature of the risky asset classification and the risk weight levels led to a wider criticism. Accordingly, the leverage ratio of Basel I is not any longer considered as an appropriate measure of a bank's capital adequacy because the weighting functions do not reflect the "true risks" of a bank and these risks may vary significantly among banks around the globe. In this sense, several shortcomings were also detected over time and the most important deficiencies are described as follows:

3.2.1 Sole Focus on Credit Risk

The framework of Basel I focused heavily on credit risks and was characterized by its poor differentiation among different types of risks, such as interest rate, foreign exchange rate risks, etc. To remedy this matter, in 1996, the Basel committee issued an amendment that extended capital requirements to market risks. However, the consideration of operational risks was postponed until the New Accord.

40 Resti, A. / Sironi, A.: Risk Management and Shareholder's Value in Banking, 2007, p. 554.

41 Ibid, p. 549.

3.2.2 OECD Membership as a base of Obligor Rating

All credit bases are assumed to be the same risks and treated as eligible for 8% risk category. Likewise, all exposures to non- OECD countries are considered riskier than the exposures to those in the OECD. In this context any loan to AAA rated multinational company generates more risks than a similar loan to a B- rated bank in Turkey. This is clearly inappropriate, as the AAA rated loan provided for a multinational company has to be supported with more regulatory capital than true economic capital.

3.2.3 Quantification of Portfolio Diversification

Since the establishment of Basel I, the international banks were fortified with different classes of assets, bundling "group" characteristics such as industry, rating, facility type or even the time horizon as means to portfolio differentiation. The recent developments in credit risk measurement and portfolio modeling have proven that the quantified risk at a portfolio level is quite different than the bundling or aggregation of credit facilities into groups. Appropriate portfolio diversification requires more sophisticated tools and concepts, which start with the calculation of "Loss given Default" (LGD), Probability of Default (PD), Exposure at Default (EAD) and then continues with the application of correlation factors. Stand-alone risk measures as well as portfolio-level correlation factors were missing in the first accord.

3.2.4 Limited Recognition of the Link between Maturity and Credit Risk

The basic rule of lending, that a loan is riskier with increasing maturity, was clearly neglected in the first accord. Especially, the revolving credit facilities with a term of less than one year did not require any regulatory capital, while a short-term facility with 366 days to maturity bore the same capital charge as any long-term facility.[42] In Turkey, where the average maturity of the deposits are usually 58 days, and that a 364-day facility is not deserving any capital charge, is a very big handicap of the first accord. The bank is clearly at risk and capital is not required for a roll-over facility. This situation led to the creation of the "364-day facility", which is usually rolled repeatedly without committing any regulatory capital.

3.2.5 Regulatory Arbitrage

The first accord put a ceiling on the technical level of risk weighted assets through the regulatory capital impositions. As banks eventually reached the limits of their risk weighted assets, they had to choose either to increase capital or divert risk weighted assets from balance sheets. Some banks started to resort to securitization or to loan sales in order to shrink their balance sheets or reduce their holdings of weighted assets. Such asset transfers worsened the credit quality of portfolios severely, which meant that the quality of the assets remaining on the books would deteriorate, defeating the purpose of the Accord. The first accord unfortunately created strong incentives for

42 Crouhy, M. / Galai, D. / Mark, R.: Risk Management, 2001, p. 69.

banks not to efficiently assess the true risks. Rather, it justified motivations to play the game of "regulatory arbitrage".

3.2.6 Limitations of Basel I in the Higher Systemic Risk Context: A Case Study for Turkey

At this stage, it is useful to look at the outcomes of implementing Basel I by the Turkish banking sector. Overall, the original Basel Capital Accord, which was a real contribution to the increase of the capital levels of the global banking system worldwide, has proven to be highly ineffective in a sophisticated, crisis prone market, such as Turkey. The first accord, which is implemented since 1992 in Turkey, was believed to be the "first line of defense" against financial instabilities before the occurrence of the twin crisis in the beginning of the new millennium[43].

Basel I was not structured to keep pace with the increasing credit risks of Turkish banks during the financial crisis periods of 2000 – 2001. It was also less integral to the ongoing supervisory processes in the country. Combined with the lack of Pillar 3 type of disclosure requirements and market discipline dictated by the Basel II accord, which should reinforce the market participants for having timely and material information with respect to the risk and capital contents of the counter party banks, the basic foundations of "stable and sound banking system" propositions were transmitted to the immaterial judgment capabilities of the individual market participants. Not having any material information to use for efficient investment and lending decisions, market participants had to rely usually on rumors and on "soft information" about the "credibility and soundness of a bank", where such misjudgment based on soft information would result in severe capital losses for many market participants. As experienced during the crises of 2000 and 2001, these losses translated from the credit crunch to liquidity squeeze threatening the current integrity of the financial system with a high number of defaulted banks leaving the system with greater macro-economic consequences. There were 20 banks of different sizes transferred to SDIF during the period of 1997-2003, while another 12 had been compulsorily merged with each other. Of these banks, 5 banks were sold to foreign banks and one of them had been completely abolished from the interconnected system. The result was a total cost of USD 49 billions to the Turkish economy, consisting merely of obligations and the transfer costs of the transferred banks out of the system. *This "systemic failure" was the cost of the missing effective regulatory and supervisory bodies in Turkey that could have taken prompt corrective actions in a timely and material manner"*[44].

Conventional prudential supervision and the existing capital adequacy framework of the first accord were not designed to deal effectively with financial disasters, such as in Turkey as well as in other developing and transition economies. "Many supervisors in countries with more volatile economies have adopted the Basel standards even when conditions do not warrant their use"[45]. There are additional reasons why they might be

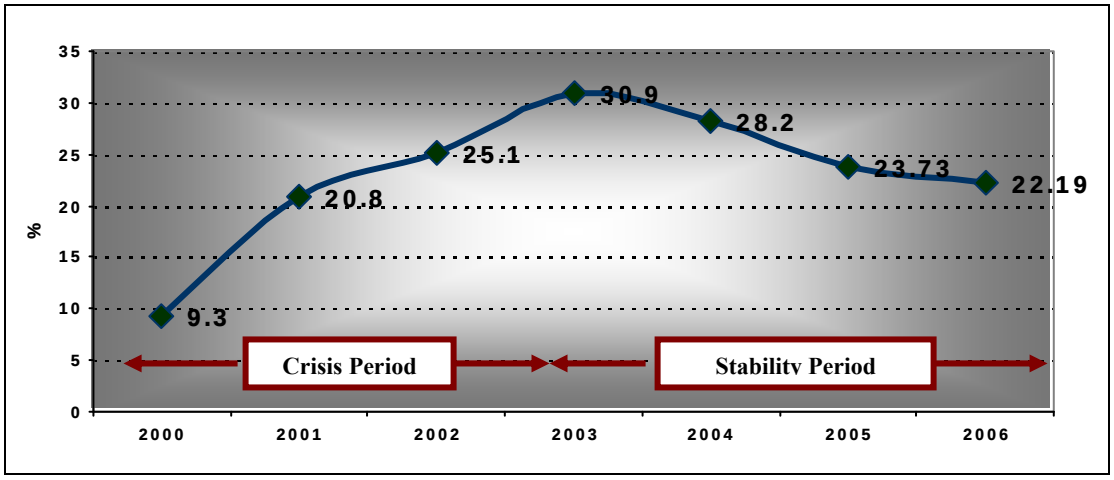
43 For Cross-Country Empirical Studies of Systemic Bank Distress, a fundamental analysis is provided by a survey implemented by the IMF staff members Demirgüc-Kunt and Detragiache (2005, pp. 1-40). Further evaluations of Basel I at Swiss banking platform is provided extensively at the superb dissertation of Dr. D. Jovic, "Risk Oriented Capital Allocation and Performance Measurement at Banks" , Haupt Verlag 1999, pp. 261-292.

44 Akcay, C.: The Turkish Banking Sector Two Years after the Crisis. In: Onis, Z. / Rubin, B. (2003, pp. 167-187).

45 Lindgren, C. J. / Garcia, G. / Saal, M.: Bank Soundness and Macroeconomic Policy, p. 188, 1996.

inappropriate. First, the default probabilities of the institutions are higher than in G10 countries due to the volatility in the macro economic environments. Therefore, the supervisory process must identify the "risk map" of the financial system and the individual banks thereon and assign the "vulnerable" banks before they jeopardize the financial system. To counter the "disaster myopia", the recognition of true systemic conditions that promote the shortsightedness is the starting point. The adoption of reforms such as the Basel II framework should then follow suits. Secondly, as depicted in Figure 3.2, the reported capital ratios are grossly overstated and the general information content of the capital adequacy ratio is unreliable. As loan classification, valuation and provisioning practices are weaker than in G10 countries, the reported capital measures are not the correct indicators of financial soundness of the individual banks and the banking system at all.

Figure 3.2: Turkish Banking System's Capital Adequacy Ratio (in %)



Source: Turkish Parliamentary Research Report

As depicted in the "U" shape of the capital adequacy ratio function above, the financial system in Turkey is proven to be highly fragile, instable and surrounded by the existence of high level systemic risks. Turkey has seen a repetition of currency and banking crisis since 1974, and even after the inception of Basel I accord in Turkey since 1992. In Figure 3.2, an observer can explore a typical boom and bust cycle in the context of systemic risks in Turkey. The cycle from the start of financial year 2000 up to the establishment of the new government and a new macro economic program in 2003, is defined as the "financial crisis" period, which is qualified as the "bust" cycle. The bust cycle entailed halving equity prices, crashing housing and foreign exchange prices, and peak interest rates. The period of 2003-2006 indicates a boom cycle or a "through-to-peak" rise driven by more "instabilities" in terms of interest, foreign exchange and asset price volatilities in the markets[46]. This period is also positively associated with "Foreign Bank Entry / Ownership", where the foreign banks exploited their advantages in "pricing and funding cost". Such exploitations presented the utmost competitive disadvantage and instability factor to the Turkish domestic banks. Both periods have witnessed consequent interventions by the supervisory authorities in Turkey.

46 For a discussion of Business Cycles and Asset Prices, pls. refer to a very recent book of Tvede, L. (2006, pp. 307).

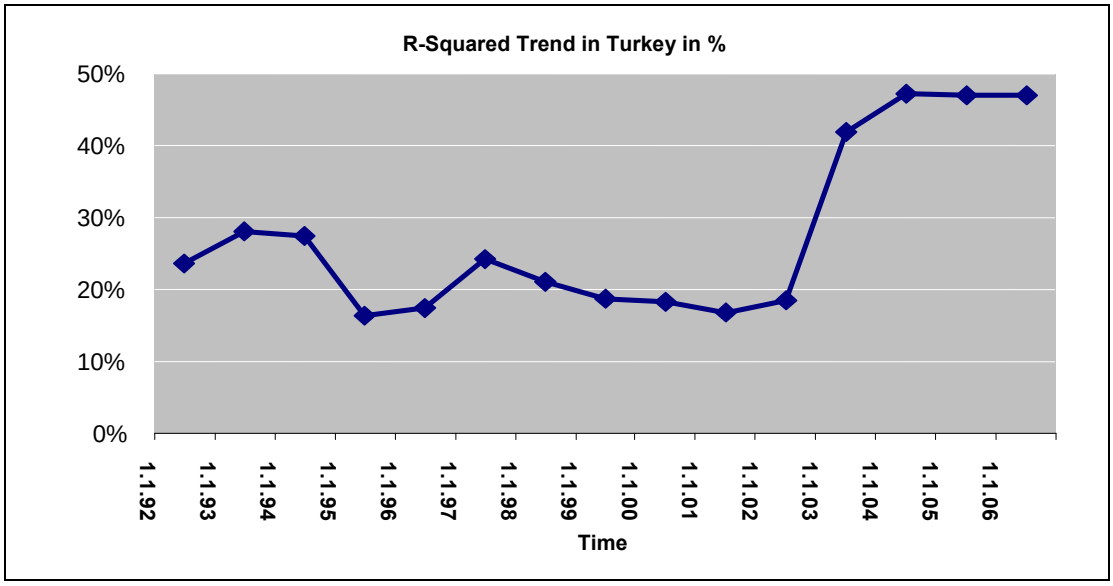
Figure 3.2 exposes the systemic solvency of the banking sector, calculated according to the Basel I accord. The banking system reads an average solvency of 18.4% during the bust cycle, when the large portion of the system's banks were insolvent at the time and their capital losses were amounting to over USD 7 billions in total. Clearly, maintaining higher capital ratios through directives was not an issue at Turkish banks. However, the question of insolvency laid more upon banks' internal processes, controls and quality of assets on their balance sheets. Banks were not adequately prepared to handle the increasing volume of business and most likely, the increasing degree of credit and market risks. Consequently, for the defined financial crisis period, the existing high level of capital ratios inherited from the first accord could not have been realistically resilient during the twin financial crisis and hence did not pass the "financial soundness test" in Turkey. Evidence in the twin crises suggests that the Basel I mandated capital adequacy ratio was an "ineffective benchmark" to sustain a sound and safe financial system in Turkey.

The period 2003-2006 reflects a boom cycle in Turkish economy, when the capital inflows were tripled and the GNP growth rates were around 10% per annum. The overly excessive capital inflows led to credit boom in Turkey as revealed by the diminishing solvency ratios. This period witnessed an extraordinary rise in the syndicated and direct debt facilities utilized by Turkish banks and corporations by a factor of 4, rising from USD 3.5 billion to USD 18 billion as of 2006 year-end. Coupled with this bubble in foreign debt, there is an alarming level of increase in the real estate lending facilities amounting to USD 16 billion[47]. In turn, the systemic risks are doubled due to rapid economic expansion and higher asset price appreciations, primarily funded by foreign debt and foreign investor demand. In this sense, the higher systemic risk would require higher level of capital and liquidity to sustain the stability of the financial system in Turkey. Taking into consideration the recent credit crunch in global markets and the existing political risks associated with the implementation of Basel II may trigger at any time a possible "retreat of the capital" and a resulting liquidity crunch in the aftermath.

In fact, despite the boom cycle indicated by Basel I-based ratios, the systemic risks (undiversifiable component of risks) have significantly increased in Turkey since 2002 from 19% to 47% in 2006, as depicted in the Figure 3.3 below. This is not surprising as in emerging markets; asset returns of firms tend to move up and down in sync with the local market (in this case, Turkey) with relatively large swings that are reflected in the empirical correlation that would pick up on this asset return volatility. In contrast, in a developed market, one would observe that the market is more subdued and individual firms would have different movements, but not all in one direction. Therefore, the R-Squared (systemic risks inherent in the firms of the economy) exploded from 2002 onwards in Turkey and not only because the empirical asset return observations showed large swings from 2002 onwards, but also earlier in the period of 1999-2002. Since R-Squared calculations take more weight on the most recent 3-year period for moving window of asset return observations, the 2003 result shows a huge jump, indicating the rapid increase of systemic (undiversifiable) risks.

47 Financial Stability Report of Central Bank of Turkey (June 2006, p. 87).

Figure 3.3: Systemic Risk Estimates in Turkey 1992-2006[48]



Source: Moody's KMV Global Asset Correlation Databases

Moody's KMV's Global Asset Correlation model finds a systemic factor that captures what is common between firms in an economy and their individual sensitivity to this common systemic factor, which is referred as the R-Squared: the correlation coefficient.

3.2.7 Overview to the Correlation Model

In essence, Moody's KMV uses 120 factors based on the global economy, region, sector, industry, and country, providing high resolution on sources of correlation. Please refer to the Appendix VI for the 120 factors in the Global Asset Correlation model. The correlation model starts by computing a series of weekly asset returns (changes in asset value) for all 39,000 publicly listed firms using asset return observations produced by its EDF model from January 1990 till December 2006 for the 2006 correlation model. The correlation factors are updated annually adding new weekly asset returns observations each year. For further details on the EDF model, please refer to Chapter 6, sub-section 6.6.2.1.

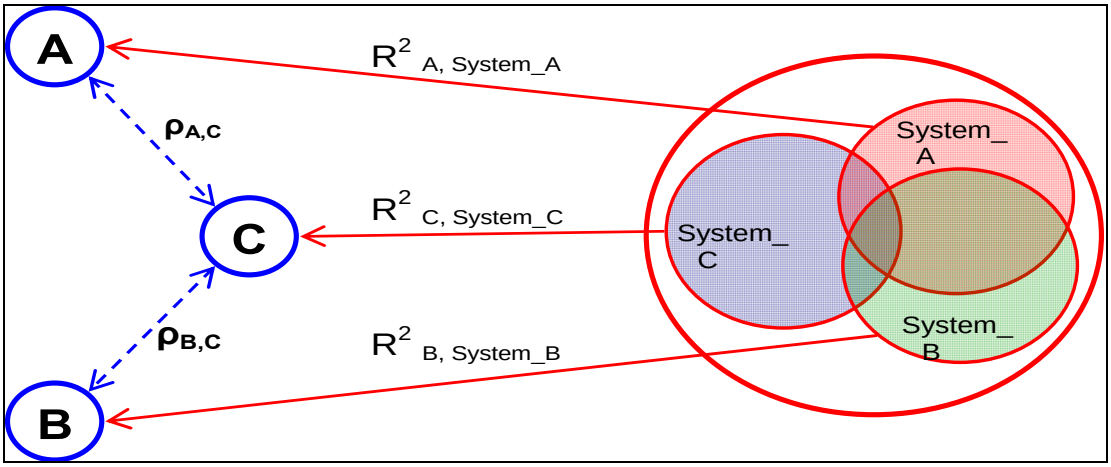
Using this individual firm asset returns, it aggregates country and industry indices and continues by regressions on these country and industry indices on orthogonal macro economic factors (e.g. global firm, small size firm, interest rate sensitivity, consumer durables factors etc) constructed from asset returns. Following this process, it builds, for each firm, a "composite factor" based on country and industry composition.

It then performs a second regression on the obligor asset return to compute R-squared, which is the portion of asset variance explained by the composite factor. In this second regression, it uses the latest 3-year weekly asset returns observations. Using these results relating to the systemic component of the asset return (R-Squared), Global

48 Data is highly confidential and undisclosed.

Correlation model determines the asset correlation among firms. As depicted in Figure 3.4 below, between two firms A and B, R-Squared determines the extent of covariance in firm's asset returns in a given composite system, C, which will be specified by common industry, country and macro factors.

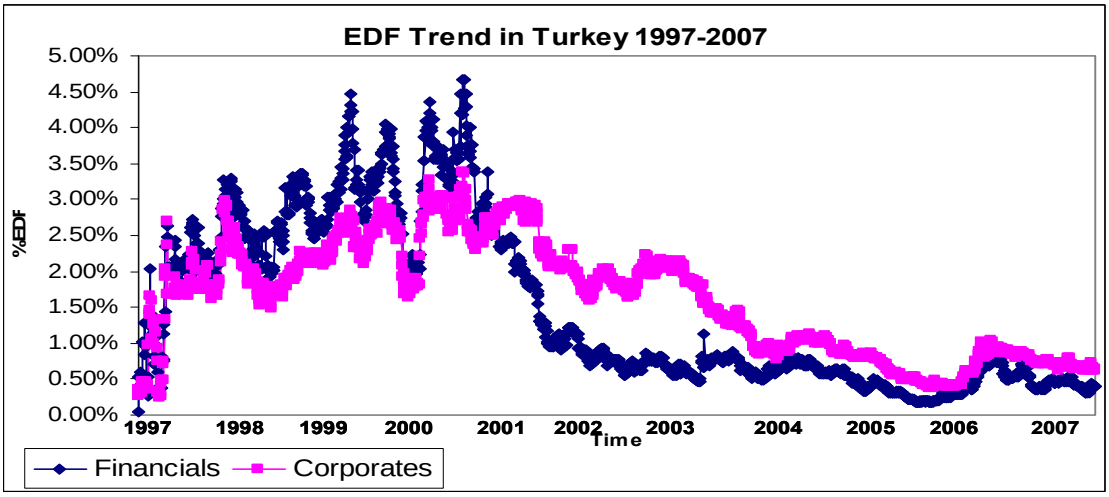
Figure 3.4: Understanding R-Squared as implemented by Moody's KMV



Source: Moody's KMV Global Asset Correlation Model

Asset correlations combined with obligor's default probabilities and transition probabilities will determine the Default Correlation and Correlated Migration among firms, including banks in a given system or economy. In general, the financial stability of the banking sector will not be threatened by single obligor defaults or simplistic capital adequacy ratios based on Basel-I rules. Rather, financial crisis occur due to correlated defaults and tail events, which are the direct results of increasing default as well as systemic risks within an economy. While R-Squared in Figure 3.3 alarmed the increasing systemic risks in Turkey since the twin crisis, the increasing default risks starting from 2006 to date in Figure 3.5 should also caution the supervisory authorities. If the default risks revert back to 2000 and 2001 levels, high default risk coupled with higher systemic risk may mean a much more severe financial crisis ahead in Turkey.

Figure 3.5: EDF of Turkish Financial Institutions and Corporations (1997-2007)



Source: Moody's KMV EDF Databases

Turkey is one of the few countries that reflect low level of Loans to Deposits or Loans over GNP ratios[49]. Accordingly, the existence of high level solvency ratios does not imply automatically the existence of a sound and capital-wise banking system. The determination of capital levels should be a direct and explicit process of outstanding risks carried on- and off the books of the banks, where the supervisors and market participants should not have any difficulty in making sound judgments about the true capital and risk levels of those banks. Here, some insights were shared from Moody's KMV's Expected Default Frequency (EDF) and Asset Correlation models as possible ways to measure and manage such systemic risks. Further discussions will be offered in Chapter 6 regarding the Moody's KMV solutions. This issue directly confronts us with the development of internal rating methods and the establishment of the robust credit risk management processes. In wrapping up the issue, the new Basel II framework should enable supervisors and market participants to better detect the ongoing risk- and supplementary capital levels in individual institutions across the financial system in Turkey. With its accent on efficient implementation of internal based risk assessment methods and systems of Basel II, banks, supervisors and finally the market place will get accurate signals about the materiality of the existing and contingent risks and take more appropriate actions in response to the changing risk appetite of the financial institutions in Turkey.

To secure a well balanced and sufficiently capitalized financial system in Turkey, the Turkish supervisory authorities should be very much aware of the hazards of existing Basel I type regulations (simple "ratio watching") and the dangers of the political developments that may lead to delayed Basel II road map. To avoid needless vulnerabilities, the long-term solution lies in the timeliness of the Basel II implementation that offers a transition of supervisory strategy from simple "ratio watching" to "risk-based process". The extent of improvements in the financial system will unfold depending on the strategies adopted by the supervisors with the new Basel II framework. Having observed the pragmatic outcomes of Basel I type of regulation in Turkey, the thesis will examine the best policies that can be adopted by the Turkish supervisory and regulatory bodies, which will be supported by empirical evidence in the next sub-section.

3.3 Empirical Evidence about Bank Supervision, Regulation and Financial Stability

The aim in this sub-chapter is to provide new empirical evidence to the statements issued at the "Basel I" critics panel through the findings of Barth, Caprio and Levine (2006, pp.178-257). According to Levine and his co-researchers, one objective of bank regulation and supervision is to reduce bank fragility and thereby avoid systemic banking failures. To assess the relationship between banking sector policies and systemic crisis, the research used a "logit probability model". The dependent variable, which is the "banking crisis", is elaborated by using a broad array of other systemic risk factors such as inflation, diversification index, capital regulatory index, official supervisory power, government-owned banks, moral hazard index, and limitations on foreign bank entry, activity restrictions and private monitoring indexes.

49 This ratio ranges between 25%-40% in general.

Initially, the systemic risk potential of the banks is mitigated to a certain extent through restrictions upon their range of activities. This is in contrast to the fact that banks generally engage in a broad array of activities whereby their income streams are diversified, making them more resilient to shocks. If this rule applies to the financial conglomerates, they become "too big to discipline", so the activity restrictions are negatively associated with bank stability as banks normally diversify their income streams by switching to more non-lending and commission-based businesses.

Secondly, the impact of deposit insurance, which intensifies moral hazard effects in form of connected lending (the period from 1985 – 2001 in Turkey), may encourage excessive risk taking behavior and overwhelm any stabilization benefits.

The researchers tested the above questions on countries with weak supervisory systems or with a regulatory environment that does not spur private or market discipline. The empirical findings surprisingly allure that there is "not any robust" link of capital regulations to financial stability and this link does not follow any predictable pattern.

In fact, this is due to the harmonization of capital adequacy standards internationally. As with the introduction of Basel I, for the majority of the countries that adopted the first accord, there were not any major differences in capital standards, which made it difficult to explain the cross-country differences in bank fragility. The harmonization of capital standards since 1988 does not enable us to identify a robust link of capital adequacy and banking operations. Therefore, the research could not confirm or reject the view that the Basel accords reduced bank fragility to lower levels than what it would have been in the absence of these accords. Similarly, in terms of Basel II's Pillar 1, the research is conclusive such that there is weak evidence that countries with more stringent capital requirements have a lower probability of systemic banking crisis.

However, the findings of Levine and his co-researchers route to the important role of Basel II's Pillar 2, which promotes the safety and soundness of the banking system through stronger banking supervision. A stronger official supervision of banks will help to overcome a number of market failures, as depicted in Figure 3.2 earlier. During the boom cycle, the economy was expanding, but with increasing systemic risks. Despite the increasing systemic risks, the result was not another financial crisis in Turkey due to stronger supervision in the marketplace. Stronger official supervision, which is ensured by the Banking Regulatory and Supervisory Agency (BRSA) in Turkey, enhanced the systems stability either by reducing the incidence of crisis through "three level oversights" and bank recapitalization programs, or by reducing the destabilizing effects of generous deposit insurance. Strong banking supervision ensures lower non-performing loan ratios and diversification in bank portfolios and hence reduces the possibility of a major crisis. So the old rule of thumb: "don't put all the eggs in one basket", holds true for Basel II Pillar 2. However, there is a warning by the researchers that excessive authorization of supervisory power is associated with greater corruption in lending, which was the case in Turkey until 2003. The findings of the research also stress the importance of Basel II Pillar 3, namely the effectiveness of transparent information disclosure to strengthen the market discipline of banks. The results indicate that the adoption of regulations forcing the disclosure of accurate and comparable information about the banks tend to have greater banking efficiency and higher integrity in lending.

In a banking environment, where governments regulate banks to facilitate the financing of government expenditures, to funnel credit to politically attractive ends through their state-owned banks, and more generally to maximize the welfare and influence of politicians and bureaucrats, the Basel II is yet to take effect. The banking system in Turkey still holds a significant amount of government debt, weighted as "zero" risk inside the current regulatory regime. The use of the state-owned bank resources to buy political support, which may be addressed as "systemic corruption" continues to be a significant issue. In Turkey, the new Basel Accord is not only about "better risk management" or "new incentives" for preserving capital, but about a truly independent supervisory framework, in order to insulate regulators from political pressures. The true independence with effective oversight seems to be an impossible combination and a difficult one to achieve in Turkey. This pressure and skepticism will challenge the Turkish banking community and the governmental authorities towards the adoption Basel II standards. As discussed in Chapter 2, the close watch by supranational anchors, the EU and other private interest groups will be pivotal in the shape Basel II unfolds in Turkey. In the next sub-section, the thesis will look more closely to the evolution, objectives and structure of the new Basel Accord.

3.4 The New Basel Accord

Having examined the shortcomings of Basel I in previous sub-section and the best policies that can be adopted by supervisory and regulatory bodies in Turkey, the thesis will now aim at explaining the new Basel accord as follows:

1. Evolution
2. Objectives
3. Building Blocks: Three pillar structure

3.4.1 Evolution of the New Basel Accord

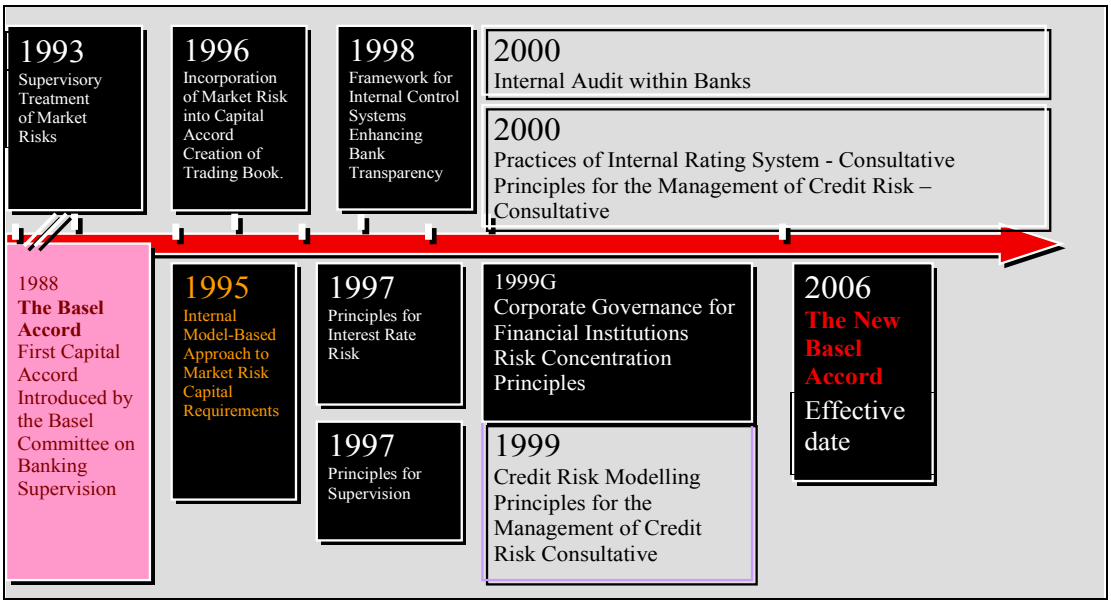
The stimulus behind the evolution of the capital convergence methods arises from the confluence of a series of trends like deregulation and increasing competition[50]. In the early 1980's, increased competition internationally led to the concern over deteriorating capital levels in international banks and the erosion of reasonable risk and reward relationship. This concern was exacerbated by the emerging debt crisis in the major developing countries. The need for a more consistent approach to capital measurement standards was fulfilled by the Basel committee members in 1988. The existing capital convergence framework essentially addressed only credit risk while banks are in reality exposed to a range of other forms of risks such as interest, foreign exchange position, settlement and operational risks. Consequently, the Basel committee and the European Commission have been pursuing intensively the different paths in which the risks other than credit risks may be incorporated appropriately within the regulatory arrangements[51]. In 1996, the Basel committee extended the original accord to encompass the market risk with an amendment that enabled banks to calculate the relevant capital requirements using either internal value-at-risk models or a simplified

50 Basel Committee for Banking Supervision: International Convergence of Capital Measurement and Capital Standards, July 1988, p. 8.

51 Price Waterhouse, Bank Capital Adequacy and Capital Convergence, 1991, pp. 3-7.

approach with requirements laid down by the Basel committee. The market risk management techniques have become more mature in recent years[52]. From the regulatory perspective, the consistent measurement, management and control of interest rate and credit risks were attracting continuous attention of the Basel Committee. By 1997, the principles for the management of interest risks were also established and later revised in July 2004. The evolution and the road ahead of Basel II are represented in Figure 3.6.

Figure 3.6: The Evolution of the New Basel Accord



Source: Ernst &Young, the New Basel Accord, presented in Istanbul, 2003

The need for a more consistent approach to capital measurement standards was fulfilled by the Basel committee members in 1988. The existing capital convergence framework essentially addressed only credit risk while banks are in reality exposed to a range of other forms of risks such as interest & foreign exchange open positions including settlement and operational risks. Consequently, the Basel committee and the European Commission have been pursuing intensively the different paths in which the risks other than credit risks may be incorporated appropriately within the regulatory arrangements[53]. In 1996, the Basel committee extended the original accord to encompass the market risk with an amendment that enabled banks to calculate the relevant capital requirements using either internal value-at-risk models or a simplified approach with requirements laid down by the Basel committee. The market risk management techniques have become more mature in recent years. From the regulatory perspective, the consistent measurement, management and control of interest rate and credit risks were attracting continuous attention of the Basel Committee. By 1997, the principles for the management of interest risks were also established and later revised in July 2004. Despite the revisions and amendments, Basel I was still creating some undesired consequences. For instance, to attain higher income to compensate the return on solvency ratios or the extra burden brought by charging the capital costs to the loan

52 According to Jorion, there are four types of financial market risks: interest rate, exchange rate, equity and commodity risk, 2001, p. 83.

53 Price Waterhouse, Bank Capital Adequacy and Capital Convergence, 1991, pp. 3-7.

pricing, banks adopted higher risk lending practices. Banks were extending loans to more risky businesses and diverted their activities more towards the emerging markets, as Basel I did not differentiate between high and low credit quality portfolios[54]. In addition, banks assumed a growing amount of leverage through derivatives, exploited the capital adequacy rules through securitization and bypassed the 1988 accord[55]. Even today, the events of summer 2007 have shown that risks remain and that Basel I was not equipped to deal with them. In particular, the rules gave banks an incentive to sell on their least securitized assets while keeping the least risky ones on their books, since both assets enjoyed the same capital charge[56]. Further creative structures to avoid capital charges are "induced" through the usage of special purpose vehicles. Because Basel I allowed banks to set aside less capital for these semi-detached conduits, all lending business and the resulting liability side transactions are "deported" to the conduits, which are kept as "off-balance-sheet" entities for reporting purposes[57].

As credit risks magnified significantly since 1988 and the credit quality worldwide continued to deteriorate, the demand for balancing the credit risks via a new sort of directives became self-evident. The complex new rules about the credit risk management principles and methodology documents were mobilized. In addition, it was understood that capital requirements alone were not sufficient to ensure safe and sound banking in 1997 and hence a major step was taken toward improving the supervisory standards. Just in the wake of the Asian crisis, the Basel committee imposed the "Core Principles of Supervision", which became the first worldwide standard for best practices of supervisory regimes[58]. The main motivation behind the core principles of supervision was the strengthening of the global financial stability. The core principles of supervision also demanded the supervisory authorities to encourage market discipline by good corporate governance and enhanced market transparency and surveillance[59]. In essence, the core principles of supervision have been the inspiration and a meta-level solution to the forthcoming pillar system of Basel II. Moreover, the Basel committee wished to encourage further "best practice" improvements in the internal risk management systems at banks through new regulations. The shortcomings listed in sub-section 3.2 showed the essential need for a new regulatory paradigm for better banking supervision, which is strongly qualitative, while also making use of the benefits of the new quantitative methodologies to quantify stand-alone and portfolio risks. In sum, the road from Basel I to Basel II provides plenty of means to strike the right balance between:

- The need for disciplining the risk taking behavior of individual banks,
- The overall impact of regulatory capital on financial stability[60],

54 According to the Professional's Handbook of Financial Risk Management, "The Basel Capital Accord generally does not recognize differences in the credit quality of bank assets for purposes of allocating risk-based capital requirements" (2000, p. 330).

55 Chorafas, D.: Economic Capital Allocation with Basel II, 2004, pp.3-60.

56 The Economist: A Special Report on the World Economy, October 20th 2007, p. 26.

57 One company, who actually transposed that conduit structure for using them as parking place for the assets and in order to hide debt was Enron. "Enron was paying USD 45 million to its advisory investment banks to raise USD 1billion in loans from those beleaguered, "prepaid" companies" as cited by Bryce, R.: Pipe Dreams, 2002, p.355.

58 Barth, J.R./Caprio, G. /Levine, R.: Rethinking Bank Regulation, 2006, p. 66.

59 Mwenda, K.: Banking Supervision and Systemic Bank Restructuring, 2000, pp.12-18.

60 Chorafas (2004, p.46)

- The consolidation of the individual core principles and regulations under the new, mutually reinforcing pillar system, which should be in command of the market discipline.

The objectives of the New Accord are aligned so as to strike the right balance among the three considerations mentioned above. The thesis will explore these objectives in the next sub-section.

3.4.2 Objectives of the New Basel Accord

The Basel committee has designed the new framework to be more forward-looking for the capital adequacy supervision, which has the capacity to evolve through time.[61] The maintenance of a forward-looking framework is one of the key objectives of the Committee, following criticisms over Basel I being time-inadequate. The new framework is a balance between the new advances in the risk management industry and the developments in the markets, constantly signaling new revisions to the Committee to propose new amendments for possible changes. Keeping up with the pace of progressive developments needs more risk-sensitive approaches to overall calculation of capital requirements and the continuous engagements of the banking industry in the discussions of prevailing risk management practices.

Basel II has also recognized the importance of bank supervision in terms of influencing the implementation of sound practices of capital calculation and exposing the true risk profiles of the individual banks. The new accord encourages supervisors to perform more "on-site" supervision at the banks and to be more critical on the methods used by the banks when determining the capital levels for each risk category. A major concretization of this predominant issue is the implementation of "MaRisk" in Germany, which imposes the Internal Capital Adequacy Process (ICAAP) as part of a robust application of "Pillar 2 and Pillar 3"[62]. The internal assessment of risk and capital profiles will be reviewed as part of the Supervisory Review Process (SREP) and the conformity with the Pillars I and III will be verified by the supervisors. The role of the regulator shall be restricted to the examination of banks' risk management procedures and to the encouragement of the use of global best practices. The regulator must also ensure that appropriate information is available to enable the market participants to assess risk, and that fair and honest dealing underpin commitments and transactions[63].The "Leitmotiv", which is the fundamental objective of the Basel framework, remains the same, namely strengthening the soundness and the stability of the international banking system. The forward-looking nature of the new accord and its empowerment of the supervisory bodies are recognized as the prerequisites of sound and stable financial systems. At the same time, the Committee wants to maintain sufficient consistency for a possible contingency, where the new capital regulation results in a competitive inequality among international active banks.[64] Consequently, this Leitmotiv on "stability and soundness" routes the architects of the new regulatory framework towards construction of the "pillar system", where the new integrated approach involves minimum capital requirements for broad category of risks,

61 BCBS: International Convergence of Capital Measurement and Capital Standards, June 2006, parag. 15

62 Eller, R./Heinrich, M./Perrot, R./Reif, M.: MaRisk in der Praxis, 2006, pp. 13-18.

63 Eatwell J. / Taylor, L.: Global Finance at Risk – The Case for International Regulation, 2000, p. 42.

64 BCBS: International Convergence of Capital Measurement and Capital Standards, June 2006, parag. 4.

supervisory review of internal bank assessments of capital relative to risk and the necessary checks of the market participants as the final word. The key word here is the "market" and its "discipline", namely the market discipline, which should promote the adoption of stronger risk management practices by the banking industry. In an environment where the scale of market and credit risks are enormously increasing, and the risks are still under priced in order to realize more market share. An appropriate level of market disclosure and its timeliness will provide benefits for the well-run institutions and for financial stability in general.

3.4.3 Three Pillars of the New Basel Accord

3.4.3.1 Overview

Basel II was released by the Basel committee in June 2004, for implementation starting in January 2007 for a group of countries. The New Framework, which is far more complex than the 1988 accord, consists of three "pillars", which are the constitutional building blocks of the New Accord.

Table 3.1: Main Features and Key Requirements of Basel II

Pillar 1: Capital Adequacy	**Main Features**	**Key Requirements**
Credit Risk 1 Standardized Approach (SA)	Greater risk sensitivity than Basel I through more risk buckets and risk weights for sovereigns and banks based on Export Credit Agency (ECA) risk scores. Operational risk charge 15 percent of annual gross income. Pillars 2 and 3 applicable.	Assessments of external rating institutions.
Credit Risk 2	More risk buckets than Basel I. Risk weights for asset classes based on ratings of external credit assessment agencies (ECAIs) or ECA scores. Enhanced credit risk mitigation available.	Ratings of ECAIs or classified rating agencies. Ability and capacity to qualify rating agencies and map agency scores
Credit Risk 3 Foundation Internal Ratings Based Approach (F-IRB)	Based on risk components: probability of default (PD), loss given default (LGD), exposure at default (EAD), and maturity (M). Banks can use own PD estimates and supervisory estimates for other components. Stress testing required.	Ability to assess banks' rating system design. Ability to validate banks' risk management and stress testing systems. Ability to provide supervisory estimates of LGD and EAD
Credit Risk 4 Advanced Internal Ratings Based Approach (A-IRB)	Capital requirements determined as in F-IRB Banks can use own estimates for PD, LGD, EAD and M; subject to supervisory validation of systems. Stress testing required.	Ability to assess banks' rating system design. Ability to validate banks' risk management and stress testing systems.
Operational Risk 1 Basic Indicator Approach	Flat rate of 15 percent of gross annual income.	
Operational Risk 2 Standardized Approach	Operational risk charges for each business line, based on annual income per business line, multiplied by risk factor per business line.	System to distinguish business lines and supervisory ability for validation of this system Data on operational risk occurrences and cost.
Operational Risk 3 Advanced Measurement Approach	Full reliance on banks' internal risk measurement systems, subject to supervisory approval.	Capacity for supervisory validation.
Pillar 2: Supervisory Review	**Main Features**	**Key Requirements**
	Banks have a process for assessing capital adequacy (ICAAP) and a strategy for maintaining capital level. Supervisors evaluate banks' internal capital adequacy systems and compliance. Higher capital adequacy levels for individual banks if risk profile requires. Early intervention by supervisors. Stress tests and Assessment of interest rate risk and concentration risk.	Supervisory ability and capacity to make the necessary assessments. Internal risk rating system as tool for measuring and monitoring credit risks. Adequate legal and regulatory framework to take action.
Pillar 3: Market discipline	**Main Features**	**Key Requirements**
	Information to be disclosed includes: Available capital in the group, capital structure, detailed capital requirements for credit risk; Breakdown of asset classification and provisioning, Breakdown of portfolios according to risk buckets and risk components, Credit risk mitigation (CRM) methods and exposure covered by CRM, Operational risk.	

Source: International Monetary Fund, Implementation of Basel II: Implications for the World Bank and the IMF, 2005

The contents of the pillars are provided in Table 3.1 are as follows: Briefly, Pillar 1 introduced a menu of options for assessing capital adequacy of banks from technically advanced options based on banks' internal risk management systems to simpler standardized approaches, representing a refinement of the Basel I. Pillar 2 necessitates an upgrading of supervisory practices to review banks' internal capital adequacy assessments, and Pillar 3 requires public disclosure of more information on banks' risk profile and risk management systems, thus supporting the functioning of market discipline.

According to IMF, "the revised capital accord (Basel II)" represents a significant improvement over the 1988 accord, and its implementation should lead to enhanced financial stability through better risk management systems in banks, better banking supervision in member states, and improved market discipline"[65]. Basel II is in turn expected to stimulate better cross-border cooperation and exchange of information between home and host supervisors, in particular, when foreign subsidiaries occasionally operate under different regulatory systems. Basel II will also enforce a global standard for the capital adequacy ratio. The ratio retained the former definition of capital and the minimum 8% requirement in the numerator. In the denominator, the measures for credit risks are more complex than Basel I while market risk measurement remains the same. The integration of operational risk as part of the capital charge is perceived as the revolutionary part of the New Framework. To ensure that risks within the entire banking group are considered, the revised accord will be extended on a consolidated basis to holding companies of the banking groups.

Beyond Pillar 1 that dealt with the risk quantification and its relevant reforms, an exceptional feature of the accord is merely on the supervisory side, where the tasks and role of supervisors are extended materially with Pillar 2. The close cooperation emphasized by Pillar 2 reflects more professionalism for the supervisory authorities, even much more than the current rule-makers even think. The new framework challenges not only the banking community through its options and alternatives, but also the market participants and the supervisors to be more proactive towards "risk sensitivity" through Pillar 3. As revealed by Table 3.1, The Basel II capital adequacy rules are based on a "menu" approach. Banks and regulators are offered several distinct sets of options for banks for computing credit, market and operational risk capital charges. Since the scope of the thesis is the credit risk measurement under Basel II implementations, the market and operational risks will fall outside the scope and will not be examined. Clearly, the focus of Basel II is emphatically on the first pillar which lays out the rules for calculating the risk weights of all kinds of assets. The first pillar was also the basis of the 1988 accord. The revised framework provides a more elaborate calculation of the credit risks and provides banks to use either a Standardized Approach or an Internal Rating Based Approach (IRB). The thesis will explore these approaches in depth in the next sub-section.

65 IMF: Public Information Notice No. 05/154, November 7, 2005.

3.4.3.2 Pillar One: The New Approach to Credit Risk Measurement

This sub-section will focus exclusively on credit risk measurement under Basel II, and is motivated by a desire to explain the new credit capital rules and to summarize the treatment of credit risk particularly under Pillar 1. Pillar 1 aims to provide increased risk sensitivity through more refined credit risk weightings under Standardized and Internal Rating Based approaches.

The first feature of Pillar 1 is the intention to improve bank's allocation of capital for credit risk by requiring relatively higher levels of capital for borrowers, which face higher levels of credit risk (obligor risk). In determining the capital level basically required for different levels of obligor risks, banks and their regulators may choose one of the three approaches (Standardized Approach and two Internal Rating Based Approaches) based on the sophistication of a bank's risk management activities and the strengths of their internal controls. *Under the Standardized Approach, banks engaging in less complex credit activities and with simpler control structures may use external measures of credit risk to assess the credit quality of their borrowers for regulatory capital purposes.* Upon regulatory approval, *banks tangibly engaged in more sophisticated risk taking activities, which have developed advanced risk measurement systems can choose IRB Approach.* The IRB Approach, in turn, comprises of two different methodologies; the Foundation and the Advanced IRB, depending on the sophistication of risk management systems of the banks. Under an IRB Approach, banks rely mainly on their own measures of a borrower's credit risk to determine their capital requirements, subject to strict data, validation and operational requirements. Whichever approach is selected, it is important to indicate that a bank must adopt the same approach on a consistent basis for all business lines globally.

3.4.3.2.1 Standardized Approach

This approach was originally introduced by the 1988 agreement for the determination of minimum capital requirements.

Table 3.2: Credit Assessments and Risk Weights under Standardized Approach

Obligor Type		AAA to AA-	A+ to A-	BBB+ to BBB-	BB+ to B-	Below B- and past due claims	Unrated
Sovereign		0%	20%	50%	100%	150%	100%
Bank	Option 1	20%	50%	100%	100%	150%	100%
Bank	Option 2	20%	50%	50%	100%	150%	50%
Bank	Option 2 Short term	20%	20%	20%	50%	150%	20%
Corporate		AAA to AA-	A+ to A-	BBB+ to BB-		Below BB-	Unrated
Corporate		20%	50%	100%		150%	100%
Regulatory Retail Portfolios		75%					
Residential Mortgages		35%, when past due 100%					
Commercial Real Estate		From 100% to 50%, upon discretion of the national authorities					

Source: BCBS: International Convergence of Capital Measurement and Capital Standards, June 2006.

The new Standardized Approach directly aims to maintain greater sensitivity to the different credit risks generating from various "obligor" types by recognizing the

assessments of external rating institutions. Under this approach, ratings produced by authorized external rating agencies provide the basis for measuring the credit risk posed by a particular borrower. Thus, external rating agencies acquire further importance under the New Accord. The decision on whether an external rating agency is recognized as suitable for assigning regulatory risk weights is taken by the national supervisors.

Under the Standardized Approach, the amount of capital basically required for a loan of 100 USD granted to a corporate account on a "clean basis", with no specific collateral, might drop to 1.6 dollars or increase upto 12 US dollars, depending on the rating assignment of the obligor. The Basel committee decided to implement the revised method in a matrix of rating and obligor types. Although the table may appear a bit confusing, at first glance, rows address the obligor types and columns show the rating classifications. Moreover, OECD membership will not any longer be a subject of reference for preferential risk weighting, which was the case in Basel I. As a consequence, claims on sovereigns that are weighted with 0%, may go up to 150%. In other words, the credit quality assessment by ratings determines the risk weighting in contrast to the simplistic and inappropriate determination by OECD membership in Basel I.

Regarding the *bank debt*, the Standardized Approach provides two choices. Option 1 as depicted at Table 3.2, the risk weight of a bank is based on the rating of the country in which the bank is incorporated or Option 2, risk weight is based on the bank's own external rating. Under Option 1, banks are assigned a risk weight one notch less favorable than the one assigned to claims on the sovereign. Under Option 2, the bank has the possibility to receive a more favorable weighting in comparison to the one assigned to the sovereign issuer, though the risk weighting can not fall short of 20%. Furthermore, short-term claims with maturity three months or less are to be assigned a preferential risk weight within certain limits. The national supervisors are in charge of determining the viable options applicable to banks in their jurisdiction.

Corporate debt, including insurance companies, is to be weighted depending on their risk rating. For this purpose, three new risk weight categories are introduced for corporates; 20%, 50% and 150%. As before, claims on unrated corporate debt are to be given a risk weight of 100%. Companies with a weak rating of B+ or lower face a higher risk weight of 150%. This implies that it is preferable not to have "any rating" than having a bad one. At national discretion, all corporate claims may be risk weighted at 100% without regard to external ratings by permission of the supervisors. Where this discretion is exercised the banks are obliged either to use ratings wherever available or not at all.

Retail credit is defined as all claims to individual persons or small businesses with maximum exposure up to EUR 1 million, and the portfolio must be sufficiently diversified. As far as the granularity is concerned, Basel Committee imposes supervisors to establish a numerical limit that no gross amount of all forms of debt exposures to one counterpart (i.e. one or several entities that maybe considered as a single beneficiary) can exceed 0.2% of the overall regulatory retail portfolio. Such claims may be risk weighted at 75% except for past due loans. National supervisors may raise this risk weight when default rates, liquidity conditions or any other specific conditions justify an increase.

It is commonly verified that *residential mortgage* lending is relatively low risk. Basel II recognizes the relatively lower risk profile of fully residential mortgage lending by assigning it a risk weight of 35%, compared to a current risk weight of 50% for residential mortgages. However, in applying the 35% weight, supervisory authorities should imply strict valuation rules. The recent sub-prime mortgage crisis in the US may change the sentiment on the lower risk profile of this debt type and imply higher risk weights in the future. Currently, strict valuation rules implied by the national supervisors appear to be the "must" covenant when assigning risk weights to residential mortgages.

Based on the experience in numerous countries, the Basel Committee regards commercial real estate lending as significantly riskier than residential mortgage lending, thus, these loans will generally not benefit from such a preferential risk weight. The Basel Committee believes that the type of mortgages on commercial real estate does not, in principle, justify (anything) other than a 100% weighting. However, a 50% risk weighting may be applied at national discretion subject to a number of conditions on loan-to-value ratios and historical loss rates[66].

Apart from the risk weightings, Basel II has enhanced the risk sensitivity of the Standardized Approach substantially through credit risk mitigation techniques. The first Accord only recognized cash and government securities as collateral, but there has been a wide expansion of the range of collateral eligible for credit risk mitigation, such as guarantees and credit derivatives, which are capable of reducing the capital charges in the New Accord. In the New Accord, the collateralization techniques and the conditions for the recognition of individual types of collateral have been elaborated in more detail for each method, in order to enable banks to reduce their capital requirements. Banks can choose between two recognition methods for financial collateral as follows:

1. **Financial Collateral - Simple Method**

   The risk weighting of the collateral is substituted for the risk weighting of the counter party for the collateralized portion of the exposure (subject to a floor of 20% except in strictly defined cases). Unlike the comprehensive method, the collateral must be pledged for at least the life of the exposure and it must be revalued at least every six months. The uncollateralized portion of the exposure is assigned the risk weight appropriate to the counterparty. This method may not be used when the IRB Approach is applied or for instruments in the trading book.

2. **Financial Collateral - Comprehensive Method**

   The eligible collateral is greater in scope than under the simple method. Banks calculate the exposure adjusted for collateral using either their own internal estimates, which are subject to approval by the supervisory authority, or regulatory treatment of volatility. The comprehensive method allows a reduction in the effective exposure of the original claim depending on haircuts that increase the nominal value of the original claim and decrease the value of the collateral.

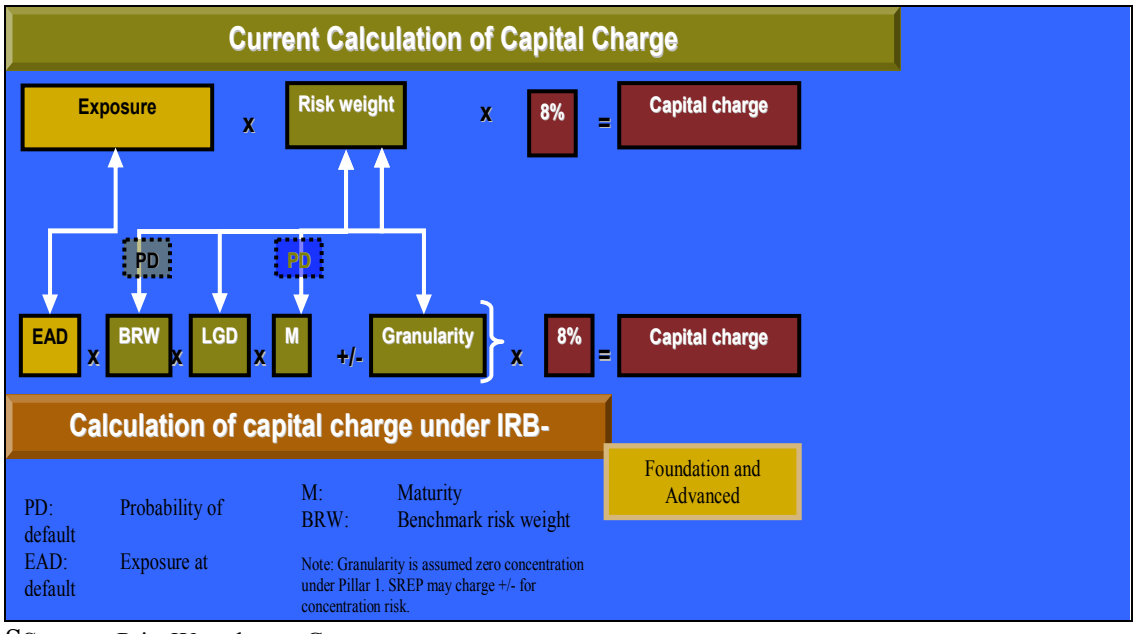
66 Commercial real estate loans could get a preferential risk weight of 50%, if there exists well-developed and long-established markets, for the tranche of the loan does not exceed the lower of 50% of the market value or 60% of the mortgage lending value.

In summary, the New Accord takes into account the *credit quality of the obligors* when assigning the risk weights and provides a more risk sensitive capital figure than the original Accord. It also allows for capital relief when appropriate collateralization is in place. To reiterate, this Approach can be applicable for institutions with simpler internal controls and less complex lending and investment activities.

3.4.3.2.2 Internal Rating Based Approach

By definition, internal rating estimates are key summary indicators of the risk inherent in an individual transaction. Internal rating estimates typically embody an assessment of the risk of loss in consequence of the default of counterparty, based on relevant quantitative and qualitative factors. The two main principles behind the IRB Approach are the use of banks' own information about the credit quality of their assets and the application of international best practices in risk measurement techniques. This contrasts with the first accord and the Standardized Approach under Basel II, which entirely rely upon supervisory inputs to determine the capital requirement. Under the IRB Approach, banks must categorize banking book transactions into six broad classes of assets with different underlying risk characteristics; corporate, sovereign, bank, retail, equity, and additional classes for securitization exposures and eligible purchased receivables. Within the corporate and the retail segments, further sub-classes of different facility types are identified. The identified facility types consist of project finance; asset backed lending, commodity finance, income producing residential finance and commercial real estate lending facilities.

Figure 3.7: Calculation of Capital charge under IRB



SSource: PriceWaterhouse Coopers

Figure 3.7 compares the formulas of risk weights under alternative capital charge calculation methods. The transition from the Standardized approach to IRB is represented by the arrows. The IRB capital charge formula derives risk weights form a continuous function based on the obligor's asset class type. *For each of the asset*

classes, there are three key risk components to be calculated. These risk components are then used as inputs into risk-weight functions for each of the asset classes to produce capital requirements for the unexpected loss portion of the total loss. The three main features of IRB approach may be defined as follows:

1. **Risk Components as Inputs for Risk Weight Functions**

   Internal or supervisory estimates of risk factors such as the probability of default (PD), Loss Given Default (LGD), Exposure at Default (EAD), Maturity (M) are inputs to the capital calculations. Everything else being equal, higher values for PD, LGD, EAD, and M lead to higher capital requirements (and vice versa). At the most advanced form, banks will calculate all of the inputs based on internal bank data. Granularity is a risk measure indicating the credit concentrations at portfolio level. Capital calculations under the New Accord assume a portfolio has an infinite granularity, i.e. a "nil concentration". Later in revised Pillar 2 considerations, concentration risks are highlighted as part of the supervisory process.

2. **Risk Weight Functions**

   The means by which the risk components for specific exposures are transformed into risk weighted assets. These are determined by national supervisors and guidelines are set out in the New Accord.

3. **Minimum Requirements:**

   The minimum requirements covering issues such as governance, independent review and data quality must be met in order to apply for IRB for a given asset class. For many of the asset classes, the Committee has made available two broad approaches: a Foundation and an Advanced approaches.

The striking point for the construction of the IRB Approach is the "Loan or Asset Classification System". In this sense, the loan classification refers to the process banks use to review their loan portfolios and assign loans to categories or grades based on the perceived risk and other relevant characteristics of the loans[67]. The process of continual review and classification of loans enables banks to monitor the quality of their loan portfolios and when necessary take remedial action to counter deterioration in the credit quality of their portfolios. It is often necessary for banks to use more complex internal classification systems than the standardized systems that the regulators require for reporting purposes. The importance of loan classification was heightened with the introduction of the 1988 accord and the new capital accord will be likely to be a catalyst towards better classification regime, as banks will be required to implement systems that separate loans into categories based on internal rating scales.

Ratings embody an assessment of the risk of loss due to default of the counterparty, based on consideration of relevant quantitative and qualitative information. Credit ratings indicate the current opinion on an obligor's overall capacity to meet its financial obligations. The objective of a rating system is to establish a uniform method of

67 Laurin, A. / Majnoni, G.: Bank Loan Classification and Provisioning Practices in Selected Developed and Emerging Countries, The World Bank, 2003, pp.1- 50.

evaluating the quality of a specific customer. On an aggregated basis, it is then possible to get a view of the overall quality of the bank's credit portfolio at any given time as well as to establish credit quality trends over time regarding the portfolio. The credit ratings can be used to prepare senior management reports at different categories, such as performance by unit, country, region and business line. Credit ratings are used as a tool to provide management with timely assessment of the overall quality of the credit portfolio which can be used for controlling, monitoring and strategic purposes. Therefore, a proper classification of rating scales is of utmost importance. The assessment of the obligor's creditworthiness influences also the decision on the required credit pricing. The rating indicates also the frequency and intensity of control and monitoring of facilities. It helps to deploy resources where it is mostly needed, which increases the efficiency and effectiveness of the review process when thousands of credits are concerned as part of bank's core business.

An internal model under IRB Approach can generate a corporate score on a numeric scale from a range between 0 and 100. Please refer to the Table 3.3 for a sample illustration. This score defines an initial counterparty rating as shown in the table below based on quantitative analysis. The next step in determining the final obligor rating is an assessment of certain additional qualitative elements that include factors such as quality of management, possible contingencies, support provided by shareholders, other factors like specific local aspects or prospective repayment capacity. The results of the qualitative factors may lead to certain adjustments to the initial obligor rating. Adjustments are made by determining a number of rating notches that are added up or subtracted from the initial rating.

Table 3.3: Mapping of the Uniform Credit Rating Scale

Internal Code	Description	Corporate Score	Public Rating Reference
0	Interbank Risk	Not applicable	Not applicable
1	Prime / very strong	92.9 – 85.8	AA- or better
2	Strong	85.7 – 71.6	A+, A, A-
3+	Acceptable – High	71.5 – 67.5	BBB+
3	Acceptable	67.4 – 62.4	BBB
3-	Acceptable – Low	62.3 – 57.3	BBB-
4+	Watch – High	57.2 – 53.2	BB+
4	Watch	53.1 – 48.1	BB
4-	Watch – Low	48.0 – 43.0	BB-
5+	Weak – High	42.9 - 38.9	B+
5	Weak – Low	38.8 – 33.8	B
5-	Special Mention	33.7 – 28.7	B-
6	Doubtful	28.6 – 14.4	CCC / CC
7	Loss	14.3 – 7.1	C / D
X	Not rated	Not applicable	Not applicable

Source: Sounders, A. / Alleni L.: Credit Risk Measurement, 2002, p.16.

Under both Foundation and Advanced IRB, banks supply their own PDs into the formulae for calculating risk weights. Basel II requires a history of minimum 5 years of default data when estimating the PDs. The key difference between Foundation and Advanced IRB is that banks rely on supervisory estimates of LGD and EAD in the foundation approach. The LGD parameters (and therefore capital requirements) can be reduced by mitigation with financial collateral and several types of physical collateral in the foundation approach. The maturity (M) is set at two and a half years except for

Repo type transactions under foundation IRB. Table 3.4 provides a map consisting of all the input variables and basic comparisons to capital adequacy calculation methods.

Table 3.4: Summary of Capital Assessment Methodologies and Risk Factors

Methodology versus Risk Factors	PROBABILITY OF DEFAULT	LOSS GIVEN DEFAULT	EXPOSURE AT DEFAULT	MATURITY	RISK WEIGHT
CURRENT METHOD (Basel I)	NA	NA	NA	NA	0%, 20%, 50%, 100%
(1) STANDARDISED	NA	NA	NA	NA	Supervisor
(2) IRB FOUNDATION	Bank	Supervisor	Supervisor	Supervisor	Depends on Facility Type (0% to150%)
(3) IRB ADVANCED	Bank	Bank	Bank	Bank with Exceptions	Supervisor

Source: Deloitte & Touch

Two other risk factors that are not presented on the above matrix for Pillar 1 standards are the granularity and correlation factors. Again, these will be dealt within Pillar 2 considerations under the domain of supervisory review process. These variables are determined by the supervisors and banks are not in any position to change those supervisory figures. Under the foundation IRB, LGD is fixed at 45% for all unsubordinated and unsecured exposures. Such value is increased to 75% for subordinated loans, but can be reduced down to 0% by the existence of adequate collateral and the haircuts.[68] There are three other types of collateral, which are accepted; trade receivables, real estate properties both being residential and commercial and other collaterals such as machinery and equipment.

Under advanced IRB, banks estimate PD, LGD, EAD and M internally. Estimation of these parameters is based on the banks' own data and is subject to strict qualifying criteria. The actual value of these parameters depends on the specific practices at banks for using risk mitigation and handling of bad loans. The absence of limitations regarding the use of any physical collateral to mitigate credit risk (and therefore to reduce capital requirements) is a notable development and a considerable inducement for banks to use the advanced IRB. The historical data required for the estimation of LGD and EAD is a minimum of 7 years. Similar to foundation IRB, the historical data requirement for PD is a minimum of 5 years.

With the Standardized Approach, the minimum capital associated with an exposure is simply 8% of risk-weighted assets, where the weighting is to be carried out subject to the system described in 3.4.3.2.1 Standardized Approach. In the absence of local rating agencies in Turkey, the application of Standardized method remains ambiguous. "To Rate or not to Rate" is the question that all relevant parties should ask in Turkey for the implementation of Basel II, Pillar 1 Standardized Approach.

The IRB method, on the other hand, relies on a more complex mechanism for transforming the major risk factors of a facility into the capital calculations. In this

68 Resti / Sironi (2007, p. 601)

context, further work and progress are needed on a number of key issues that have emerged as potentially important in developing an IRB approach.

For example, there is not any single benchmark for the design and operation of an internal rating system, which makes the implementation and supervision of candidate bank systems difficult. In addition, measurement uncertainties represent a significant source of inconsistency and/or quantification error that will need to be considered explicitly in an IRB framework. There appears to be a relatively limited set of data sources and techniques available to banks in estimating loss characteristics (e.g., the likelihood that a borrower in a given grade will default on their obligations, the economic loss likely to be experienced should such a default occur, and associated parameters such as the likely level of exposure to that borrower at the time of such default). Moreover, these data sources appear to have potentially significant inconsistencies with each other. As a result, variation among sources and techniques wind up in variation among capital charges associated with each bucket based on estimates of its relative riskiness. Additionally, the IRB should be an integral part of business and risk management decisions and bounded in the risk management culture of a bank (use-test proof)[69]. The use test will be analyzed in detail during Pillar 2 discussions in sub-section 3.4.3.3 of this chapter.

Finally, there are minimum standards and sound practice guidelines required for key elements of the rating process, including key characteristics of the rating system construction. A supervisory process for validation, including ways of ensuring that a rating reflects all relevant information on the underlying risk of an exposure, that the process by which it is assigned ensures its integrity, and that the underlying measures of loss are consistent and comparable across banking institutions, countries, and over time[70].

3.4.3.3 Pillar Two: Role of the Supervision

The banking supervision is not an exact science, but merely a way of art. The art of Pillar 2 is summarized under two mutually reinforcing processes. The second pillar sets out fundamental principles for the overall supervision and its two main complementary elements: the Internal Capital Adequacy Assessment Process (ICAAP) - which is the banks' own evaluation of their capital needs - and the Supervisory Review and Evaluation Process - the supervisors' process (SREP) to evaluate banks. The Supervisory Review Process of the new framework is intended not only to ensure that banks have identified risks in Pillar 1 and consecutive risks identified in Pillar 2, but also to mobilize an internal capital assessment process to support the capital level against the risk profile inherent in their business. According to Bafin, the main aim of the supervisory review process can be summarized as “Banks are to be encouraged to continuously improve their internal procedures for assessing their institute-specific risk situation and the adequacy of their capital. The same applies to the ongoing adjustment and further development of new methods of risk management and internal control”.[71]

69 Hills, S. / Barrett, R.: Explaining the Credit Risk Elements in Basel II. In: The Basel Handbook, 2007, p.55.

70 BCBS, Range of Practice in Banks’ Internal Ratings Systems, A discussion paper by the Basel Committee on Banking Supervision, Basel, January 2000.

71 http://www.bundesbank.de/bankenaufsicht/bankenaufsicht_basel_saeule2.en.php. Please refer to circular 18/2005 of Bafin, Minimum Requirements for Risk Management MaRisk for details.

Similarly, the Committee for Banking Supervisor's (CEBS) consultation document for SREP stresses that "Institutions should 'own', develop and manage their risk management processes; The ICAAP belongs to the institution and supervisors should not dictate how it is applied. The task of the supervisory authority is to review and evaluate the ICAAP and the soundness of the internal processes within which it is used"[72]. How the art is technically exercised, is left to the discretions of banking institution itself.

Pillar 2 also encourages banks to develop and use better risk management techniques and systems in monitoring and managing risks. Within the Pillar 2, the triangle that exist between the initial capital, the potential and actual risks taken and the probability of the bank being forced to default, is constantly measured and evaluated. The resulting "economic capital" in this sense, is one of the most important risk metrics, which provides us a unifying framework to translate all risks into a single metric[73]. This essential attribute, namely the redefinition of capital in this way, reflects one of the major differentiations of the new accord against its predecessor. Furthermore, in implementing the new framework, the communication between the home and host country supervisors are especially encouraged in order to reduce the compliance burden and to avoid the regulatory arbitrage. In general, banks should take account of the true economic nature of transactions in the determination of strong capital adequacy globally. On the other hand, it is the duty of the national supervisors on bank vigilance when determining capital adequacy.

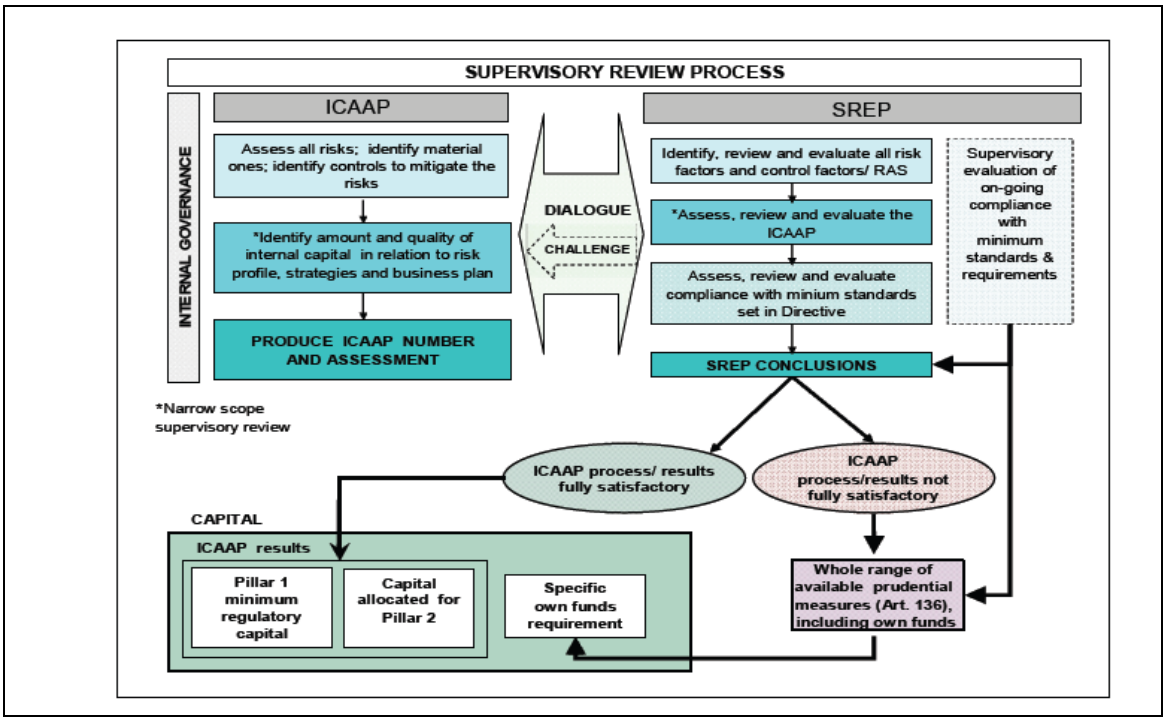
Under Pillar 2, supervision begins at licensing with an assessment of a bank's integrity, skills and financial strength to ensure the safety and soundness of all authorized financial institutions. "This involves a determination of the adequacy of capital ...so as to minimize the chances of failure"[74]. It is then extended to the supervisory revision and evaluation process (SREP). The supervisory revision process recognizes the responsibility of the board and senior management in developing an internal capital assessment process, which should be in line with the bank's risk profile as quantified in Pillar 1. In the new framework, the bank management bears the primary responsibility to ensure a framework for assessing the various risks. They should also be in a position for developing a system to relate risks of the bank to a certain capital level and establish a method for monitoring the compliance with internal policies. This process is cemented with the capital level maintenance strategy, which is referred as Internal Capital Adequacy Assessment Process. The SREP essentially reviews and evaluates the ICAAP and the risk profiles from the supervisory point of view and takes prompt corrective actions if necessary.

72 CEBS: Consultation Paper Application of the Supervisory Review Process under Pillar 2, 2005

73 Marrison, Ch.: The Fundamentals of Risk Measurement, p. 16, 2002.

74 Hayvard, P.: The Financial Sector – The Responsibilities of the Public Agencies. In: Enoch (et al.): Building Strong Banks, International Monetary Fund, 2002, p. 187.

Figure 3.8: Supervisory Review Process[75]



Source: Committee for European Banking Supervisors (CEBS)

As depicted by the CEBS in the above diagram, two integrated sub-processes; ICAAP and SREP both should be integrated into the strategic management of a bank. Especially, the coordination needed among the two pertinent processes and the dialogue required between their respective owners, namely the bank management and the supervisors are impressive. In practice, they are closely intertwined requiring extensive interaction among all parties. Pillar 2 aims to ensure that the necessary dialogue and feedback mechanism are in place. Further clarification and guidance will still be needed to ensure the soundness of this mechanism.

3.4.3.3.1 Internal Capital Adequacy Assessment Process (ICAAP)

By definition the ICAAP is comprised of a bank's procedures and measures designed to ensure the following:

1. The appropriate identification and measurement of risks.
2. Derivation of an appropriate level of internal capital in relation to the bank's risk profile.
3. The application and development of suitable risk management systems.

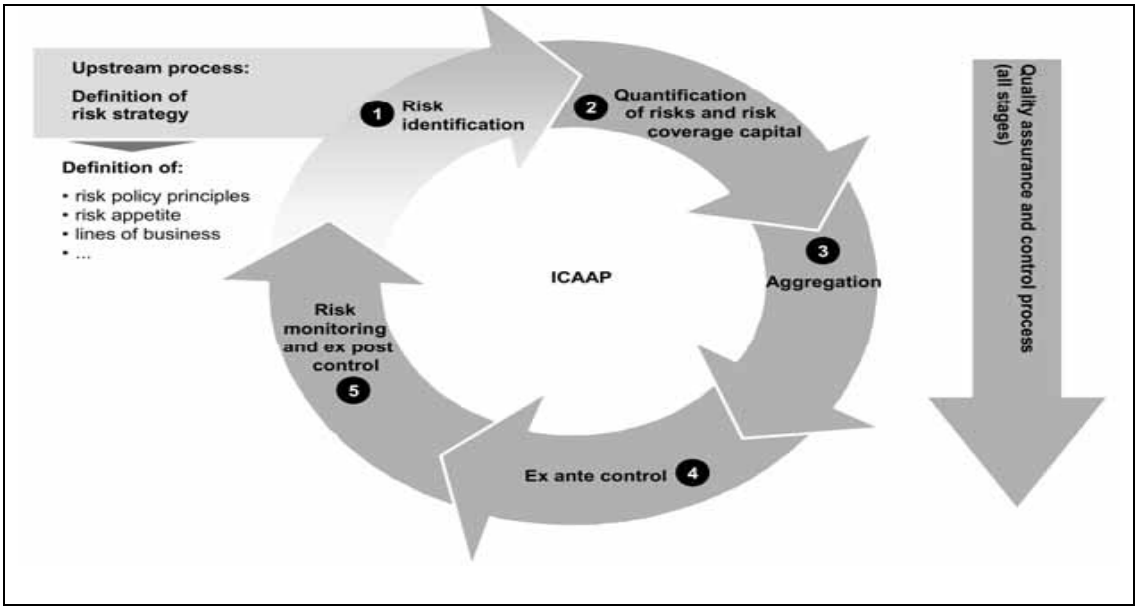
As shown in Figure 3.9, the Risk Management Process (RMP) during ICAAP can be subdivided into five stages[76]. The purpose of the initial stage in the RMP is to record in a structured way as many risks as possible. Next is to find and define suitable risk measurement methods for the risks. In the process of identifying risks, the banks should also define the data types and how data supports the measurement process. The second stage in the ICAAP is the quantification of risks. Without risk quantification, the bank

75 CEBS, Consultation Paper, Application of the Supervisory Review Process under Pillar 2, 2005

76 ONB: Guidelines on Bank-Wide Risk Management Process, Internal Capital Adequacy Process, 2006, p. 68.

cannot define its risk-bearing capacity and control. Once the risks are quantified, they have to be aggregated to determine the bank's overall risk in the ICAAP. The ex ante control of risks are done via operational limit and pricing systems, while the ex post control is done via continuous ICAAP reporting systems. The bank's risks have to be brought into line with its risk targets and preferences. Accordingly, the risks may be mitigated, transferred or reallocated. At the end, bank may be required to raise new capital based on the outcome of SREP.

Figure 3.9: Stages of the Integrated ICAAP



Source: Oesterreichische National Bank

Once all material risks have been identified, evaluated and aggregated to yield the bank's consolidated risk position, the challenge arises as to what amount and what type of coverage capital is available to service the risk appetite. Specifically, core capital, sustainable reserves including the hidden ones and supplementary capital should entirely be available. In particular, certain components of Tier 2 capital (liability reserves, provisions, supplementary capital or subordinated debt) and of Tier 3 capital should be analyzed carefully. It is the bank's responsibility to identify and categorize its individual types of coverage capital. The coverage capital should be allocated to business units through assigned limits. A limit system per business unit is an important prerequisite for maintaining risk-bearing capacity. Not surprisingly, ICAAP will be one of the core elements of business strategy with a wide array of consequences on day-to-day capital management decisions, which need to be backed up by internal governance. ICAAP is not meant to suggest that existing mechanisms, which have formally met the fundamental needs of institutions over the years, necessarily need to be replaced. However, adequate processes need to be in place to ensure ICAAP, such that ICAAP is embedded in the institution's business and organizational processes. ICAAP should not simply be regarded as an add-on that permits both supervisory and management functions to 'tick a box' and indicate that supervisory expectations nominally have been met.

Besides there are critical success factors in ICAAP implementation which are quite crucial. For example, early detection of requirements of Pillar 2 with respect to internal risks management system. This means that a bank should make efforts to detect gaps in its fulfillment of requirements as early as possible regardless of the timing of Basel II.

Determining the requirements and closing the gaps will definitely help to increase the risk-bearing capacity of the bank.

Furthermore, the bank should determine the methods and procedures which best suit its needs, as these determine the validity of ICAAP as well as the required implementation resources. Consequently, bank should develop a master implementation plan, which covers planning, budgeting and prioritizing of all ICAAP implementation tasks. Once the plan reaches a certain scale, then detailed project plans should emerge out of the needs and demands for other risk types.

The need for ICAAP and its benefits for the bank should be communicated to all levels of a bank. The client, product and risk management groups should be indoctrinated with the upcoming concepts such as risk adjusted capital or portfolio management concepts. ICAAP process is highly resource intensive and needs extra know-how that may not be available internally. Resource requirements will depend on the bank's size and risk profile and educational requirements vary as with bank profiles.

ICAAP also demands huge amounts of data and challenges the interconnected IT system of a bank considerably. Furthermore, it may require additional risk management systems, which bank is not accustomed to before and integration with external provider systems needs to be considered and explained in detail[77].

The overall responsibility for the ICAAP lies with the board of the bank, which means that the senior management will design the ICAAP with risk management function providing significant input and insight over the risk profile of the bank and the resultant capital. It is important to note that independent view during the ICAAP will be crucial, either by internal audit or external consultants. ICAAP is sponsored by the supervisors such that it promotes further discussions between the board members and the risk management as well as other functions at the bank. It should not simply be regarded as a board approval of the capital. *Rather, the board is widely expected and required to understand and challenge whether all risks are material, how they are measured, managed and mitigated.*

For non-Pillar 1 type of risks, which are difficult to quantify or model, e.g. reputation, liquidity or strategic risk, ICAAP should ensure that there is sufficient management oversight, contingency planning and stress-testing at the bank for the prevention of such risks. If necessary, boundaries with other risks should be drawn for those risks.
For example, bank can identify what portion of reputation risk is operational risk. Residual risk can then be managed through contingency planning.

While most banks model the liquidity risks with advanced technologies, they would not necessarily hold capital for the liquidity risk. Although lack of capital may cause a liquidity problem at the bank, a lack of liquidity can not be solved with capital. Hence, most institutions do not allocate capital for liquidity risks. Again, this does not mean that ICAAP should ignore the contingency planning and stress-testing that is critical in understanding and managing liquidity risks.

77 ONB (2006, p. 80)

Regarding the strategic risks, banks should consider when business risk ends, and strategic risk starts. Sound strategic planning process with good management oversight can be used as first line of defense for such risks. Hence, such planning process should be included in the bank's ICAAP.

Furthermore, ICAAP will determine the powerful effectiveness of the Basel II implementation at the bank through "use tests". The typical "use test" candidates will involve the monitoring and capital management functions on business units and the group level. In addition, further use tests can be extended to the strategic planning and budgeting functions as well as performance measurement. Sometimes, the involvement of investor relations and pricing departments can be requested at use tests. The key aim is to foster a proactive risk management culture at all levels of the bank.

Quantitative capital assessment is an important part of ICAAP. However, when capital is not the best mitigant for certain types of risks, control and contingency processes need to be well documented in ICAAP. Senior management and board involvement and challenge ensure an effective ICAAP. Insufficient controls over the ICAAP (for example, insufficient evidence at use test) could lead to capital add-ons during the SREP. Therefore, a bank's risk culture and processes are as important as the sophistication of its capital model. In the next sub-section, the thesis will examine the supervisory review and evaluation process, which is complimentary to the ICAAP.

3.4.3.3.2 Supervisory Review and Evaluation Process (SREP)

The new supervisory framework proposed by Basel II is not aiming to speculate on the increased level of capital, if and when the risks of a bank increase disproportionately. In contrary, it deploys means to deal with increased volatility and risky exposure types, namely the measures such as strengthening risk management, improving the limit- and risk systems, better provisioning policies combined with more efficient internal control mechanisms. Furthermore, the Basel committee is of the opinion that "capital only solution" or capital as the only risk metric can not replace fundamentally inadequate risk management processes in a bank, where the top management should always be aware of increasing risk profile of the bank, including awareness of risks that are not quantifiable by a capital measure.

The sprit of Pillar 2 is the assessment and treatment of risks that are not fully captured by the Pillar 1.[78] Material factors, such as liquidity, concentration, business, strategic and reputation risks can be external to the bank (e.g. business cycle effects) and these factors should be captured by the supervisory review and evaluation process proposed in Pillar 2. For example, non-Pillar 1 type of residual risks, such as litigation, guarantor and documentation risks need to be evaluated in Pillar 2 supervisory process.[79] Supervisors must ensure that all disclosure requirements with respect to Pillar 3 are being met on a continuous basis. As part of the supervisory review, the credit risk mitigation techniques and policies should be carefully documented to the satisfaction of supervisors. A special emphasis is given in Pillar 2 for the execution of "Core Principles of Supervision", which became the minimum standards of supervision since 1997 with regards to the operational and credit risk management issues.

78 BCBS: (2006, parag. 724.)

79 BCBS (2006, parag. 767)

In its emphasis of risks, Pillar 2 overcomes a substantial limitation of the 1988 accord, which barely distinguished between high- and low-risk transactions. With Pillar 2, the new accord introduces a more economic assessment of the regulatory capital. That is, it enables banks to determine capital adequacy based on the level of risk posed by a transaction. The definition of capital is the amount set aside as a buffer against potential losses inherent in a particular business activity given a certain confidence interval.

The result of SERP leads to the following financial descriptions of banks; 1) Well Capitalized, 2) Undercapitalized, 3) Significantly Undercapitalized, and 4) critically Undercapitalized (2% equity to RWA ratio)[80]. The regulators are required to place the institution into a prompt corrective action.

Basel committee is of the opinion that some "discretionary" elements in the supervision are inevitable. This refers that excessive capital requirements may be set above the regulatory upper bound for specific banks in consequence of the exceptional conditions. Such discretion will be highly critical for emerging or transition economies in terms of sustaining sound and stable financial markets and the thesis will discuss the national supervisory elements in Turkey in the next sub-section of this chapter.

For example, in the UK, the FSA has stated that, "They normally expect Pillar 1 capital to be sufficient to well-diversified banks. Additional capital may be needed in Pillar 2 for lack of diversification and inefficiencies of Pillar 1 processes"[81].

In a sense, national supervisors may increase capital (e.g. regulatory capital equals Pillar 1 capital plus X) at their discretion, if banks are unable to prove their case for diversification benefits and efficiency of their internal processes. Moreover, UK FSA also stated that the link between Pillar 1 and Pillar 2 must be sound while Pillar 2 should be forward-looking and linked closely with business growth plans and risk appetite changes. Respectively, unambiguous stress-testing protocols are paramount and these must be supported by robust business rationales.

In addition, national supervisors will be looking to assess the banks in their ability to identify the nature of each risk, explain the ways to quantify and mitigate such risks and carefully apply best practice in doing so. Strikingly, peer comparison can be, as stated by the UK FSA, used as one review tool and particularly, to assess practices at the bank are reasonable. It is possible that less than best practice can be penalized during SREP and hence additional capital charges may be applied by the supervisors. Indeed, the increased competition among peers to set the best practice will likely lead to effective oversight and governance at banks and promotes a more proactive risk management culture from the board to risk managers and credit officers.

Basel committee in a recent study stated that concentration risk (which is assumed zero in Pillar 1) may increase capital requirements up to 50%[82]. Concentration risk has been one of the major contributors to banking distress because correlation exists among assets in the portfolio. Supervisors will review the adequacy of banks' systems and

80 Kaufmann, G.: The Roar that Moused. In: Gup, B, E. (ed.): The New Basel Capital Accord, 2004, p. 45.

81 UK Financial Services Authority, "Our Pillar 2 Framework", May 2007.

82 BIS Working Paper 15, November 2006.

approaches, in measuring correlation risks. Traditionally, the limit systems of the banks apparently are not driven by considerations relating to concentration risk. Under Pillar 2, the limit system of the bank needs to adequately take into account concentration effects. During SREP, banks need to prove that they do possess sufficient processes and methodologies in place and able to materially capture and mitigate concentration risks. *In sum, the regulatory capital may be equal to Pillar 1 plus Pillar 2 capital, which will be the result of the SREP.* Interestingly, banks' efforts have mostly been towards minimum requirements under Pillar 1, although Pillar 2 may promise further capital charges to banks.

3.4.3.3.3 Banking Supervision in Turkey

"Government collapses are rare. Bank collapses are not"[83]. This statement reflects the general attitude of the domestic market practitioners in the wake of year 2000, and the financial stability therefore was largely a matter of convention between the governmental agencies and the market participants. Consequently, a fundamental task of the monetary authorities was to ensure that convention is stable and should sustain confidence in the functioning of the under developed financial markets. This convention was also based on the "unlimited" provision of government guarantee for the deposits of the banks and the bank owners knew that the influential authorities would always bail them out to stop bank failures. This policy inflicted intolerable damage to the economy and to the financial system as a whole and the supervision was resilient to the existence of moral hazard problems. Until the establishment of BRSA by the year 2000 in Turkey, the power to supervise and regulate the banks were shared between the CBOT and the UT, which were officially reporting to the Ministry of State. Upon the decision by the Minister of the State, the central bank could have taken corrective actions with respect to the irregularities detected in liquidity, capital adequacy, and in group lending practices of the audited banks. Mostly, the Minister of State would not even take the necessary steps or decisions to use disciplinary enforcements or take "prompt corrective actions" against such powerful groups of the private banks, which held wide influence over the public opinion through their media companies. The main concern was not the safety and soundness of the Turkish banking system, but it was more on that of getting the "support of the arms-length groups" to stay in power. Disciplinary enforcements and corrective actions meant loosing political power at times of elections.

Before the establishment of the BRSA, the Minister of Councils licensed the start-up of several infant banks just 10 days before the election of 1992. At the same period, twelve other banks applied to the Treasury for the start-up licenses but their application was not taken into consideration. This sort of arbitrary decision to give licenses for the start-up banks was accustomed during other interim administrations. Banks with inadequate capital which gained strength from the interim administrations did not care about the risks of banking business. Rather, the owners of such banks found the dominant interest in the misuse of customer savings accounts. Nonetheless, the problem was how to harness and divert the public funds to the "creative powers" of their own industrial groups, without paying any costs for self-destruction. Important political figures in the administrations and high ranked officials took their contributions in the holding companies directly or indirectly from the speculations. As the financial system collapsed and the scale of the losses spread from the banking system to corporations, "something had to be done". With the formation of Banking Regulatory and Supervisory Agency (BRSA) in September 2000 as the main prudential regulatory and

83 Eatwell, J. / Taylor, L.: Global Finance at Risk – The Case for International Regulation, 2002, p. 11.

supervisory body, it started a vigilant capital adequacy assessment process. This was consisting of a three-phase-audit program. According to this audit-program, independent audit institutions carried out the first and second phases, and the final evaluation was performed by the BRSA.

The first audit worked along the joint obligation for banks to prepare supplementary reporting schedules within the framework of detailed instructions by the BRSA. Instructions for preparing the supplementary reporting schedules and statements are focused on four areas; 1) Capital adequacy, 2) Credit portfolio and Counterpart Risk, 3) Risk groups to which the bank owns "structured transactions" and 4) Other income recognition issues[84].

The independent auditing institutions that carried out the first phase of the audit must, in addition to auditing the financial statements, examine the supplementary reporting schedules prepared by the banks. Banks retained their responsibilities to supply consistent and accurate information. The independent auditing institution is held responsible for their reporting on whether the bank schedules are consistent and accurate, and supplying adjustments when necessary. These audits resulted in several findings of substantial offences that are carried out by the banks as follows:

1. Allocation of loans to the related group companies.
2. Distance to the normal course of banking activities.
3. Excessive concentration of risks on related parties.
4. Carrying on a regulated activity without authorization or exemption such as trading of t-bills without authorization.
5. Providing false or misleading information to an auditor or the supervisory institutions.
6. Reporting of materially misleading statements like reduced level of deposits or non-existing income or revenues.
7. Concealing material facts with the intention of inducing another deal or in an investment.
8. Acting intentionally to create a false or misleading impression as to the capital adequacy of the bank.

The audit list of misconduct and fraudulent structures should have been much longer than outlined above. Just the unauthorized exercise of T-bills trading of a private bank at that time had resulted not only in huge negative shocks to the real economy and to the consumers, it was also accompanied by additional costs to the government in an amount of 2 billions USD. The mismanagement of risks combined with "under regulation" of those malpractices of the market players, even jeopardized the success of the IMF stabilization program. In the Turkish case, the regulators were running several steps behind the "creative structures" of market practitioners.

However, the dividing line between the activities of the regulatory authorities and the unregulated activities of the market is not a fixed point, it is a pendulum[85]. The pendulum is now on the side of the regulators and the necessity for a Pillar 2 type of

84 BRSA Recapitalization Reports, 2002. For Recapitalization of Banks in a systemic crisis, Enoch, Ch.: Recapitalizing Banks with Public Banks – Selected Issues, 2002, pp. 308-367.

85 Eatwell, J. / Taylor, L.: Global Finance at Risk – The case for international regulation, 2000, p. 19.

supervisory review has been echoed in Turkey not only by the supervisory authorities, but more often by the market participants and business leaders that experienced the bitter consequences of 2000 and 2001 financial market crises. Effective supervision of banks' risks and capital adequacy levels will not only enable a well-run financial market, but also the successful implementation of macro-economic and monetary policies. The new set of rules in Pillar 2 will enhance the risk measurement and management of banks, which not only foster the solidity and soundness of individual institutions, but also strengthen the stability of the whole banking system. In addition, the new capital requirements provide a unique window of opportunity to achieve increased convergence of national rules and practices when implementing the Pillar 2. However, this is not an easy task as cross-country differences in legal and administrative systems still exist, which means that supervisory practices will not converge over night. But something must be done and the immediate answer lies on the side of the Pillar 3 of the framework. With enhanced volume of market disclosure requirements, it is hoped that the market participants will be able to rule the fraudulent banks out of the system, take actions against common market abuse and financial crime. In the next sub-section, the thesis will pinpoint the requirements under Pillar 3 and elaborate on its effects over existing fraudulent banking practices in Turkey.

3.4.3.4 Pillar Three: Discipline of the Market

Pillar 3 is complimentary to the minimum requirements of Pillar 1 and the supervisory review process of Pillar 2. Basel committee aims to encourage market discipline by developing a set of disclosure requirements which will allow market participants to assess the capital structure, risk exposures (credit, market, operational, equity and interest), risk assessment processes, and hence the capital adequacy of the institution. The committee proposed six disclosures in three broad areas: 1) Capital, 2) Risk exposure and 3) Capital adequacy. The recommendations were as follows:

1. **Capital Contour**

A bank should, at least annually and more frequently where possible and appropriate, publicly disclose summary information about:

a) Its capital structure and components of capital.
b) The terms and conditions of the main features of capital instruments.

A bank should disclose information on its accounting policies for the valuation of assets and liabilities, provisioning and income recognition.

2. Risk Exposures

A bank should publicly disclose qualitative and quantitative information about its risk exposures, involving the techniques for managing risk.

3. Capital Adequacy

A bank should, at least annually, publicly disclose its capital ratio and other relevant information on its capital adequacy on a consolidated basis. A bank should disclose measures of risk exposures calculated in accordance with the methodology set out in

the Basel capital accord. A bank should provide an analysis of factors impacting on its capital adequacy position.

a) Changes in capital structure and the impact on key ratios and overall capital position.
b) Its contingency planning, should it need to access the capital markets in times of stress.
c) Its capital management strategy and consideration of future capital plans (where appropriate).
d) The impact of any non-deduction of participation in Banks and other financial institutions, where applicable.

A bank is encouraged to disclose its structure and process of allocating economic capital to its business activities. Considering the responses received to the consultation, the Committee remains convinced that such disclosures will form the basis of an effective market discipline in the banking sector. In principle, banks' disclosures should be consistent with how senior management and the board of directors assess and manage the risks of the bank. Under Pillar 1, banks use specified approaches/methodologies for measuring the various risks and the resulting capital requirements. The committee believes that providing disclosures that are based on this common framework is an effective means of informing the market about a bank's exposure to those risks and provides a consistent and understandable disclosure[86].

Market Discipline is one of the most important innovations inside the pillar system of Basel II and exactly this unique attribute distinguishes the Basel II from being a pure "capital accord" such as Basel I[87]. However, the meaning of market discipline is unclear and its content may be fundamentally different during the times of turbulences. The Committee does not prescribe any clarification on the subject. Instead, it provides the basis of disclosures, consisting of capital risk exposures, risk assessment procedures and the capital adequacy of the institution[88]. According to the Committee, the market discipline can contribute to a safe and sound banking environment.

In its extreme form, market discipline means total reliance upon competitive forces imposing losses and ultimately failure on suppliers that do not operate efficiently (Leathers and Raines, 2000, p. 164)[89]. According to the Federal Reserve, market discipline can be categorized into two types. The direct market discipline is the cost of borrowed funds, which reflects the bank's risk profile. The private market participants or governmental regulators constitute the secondary, indirect market discipline, which monitor the market prices of financial instruments in order to assess bank risk. An indirect type of market discipline puts more emphasis on the pricing within the markets assuming it is an efficient market. Silvio Tittonel from the Basel committee, on the other hand, described the market discipline as "Market Discipline is the third pillar of the new framework for capital adequacy, and complements capital requirements (Pillar 1) and the supervisory review process (Pillar 2) to promote the safety and soundness in banks and the financial system". The strongest definition is provided by Bliss and

86 BCBS (2004, parag. 80)

87 Chorafas (2004, pp.84-104)

88 BCBS (2006, parag. 809).

89 Quoted in: Gup, E. B. (eds.): Market Discipline: Is it Fact or Fiction. In: The New Basel Capital Accord, 2004, pp.67-96.

Flannery (2000)[90], who state that "the market discipline is the evaluation of the true financial conditions of a firm by the investors, whose feedback impounded in the resulting security prices". This feedback requires information that should be timely, material and relevant for its users to take effective and efficient decisions. In order for the disclosure mechanism of Pillar 3 to function properly, the users or the addressees of the information must be able to understand the content, depending on their different needs for information.

It is particularly important to ensure that both regulators and audit companies identify the undersized forms and origins of risk as accurately as possible. Regulatory approaches that fail to do so can lead to perverse incentives and other outcomes undesirable to the regulators and other market participants. It is the regulator's obligation to ensure that appropriate information is available so that other market participants can accurately assess risk and that fair dealing underpins commitment. In the pace of rapidly changing markets, the regulator should be close to the market participants. If not, it should at least assure that there are not fraudulent players in the market. Regarding fraudulent practices, Turkey has enough cases where the stakeholders (auditors, depositors, investors, rating agencies, government agencies, etc.) may not know the true condition of such banks. Pillar 3 aims for a qualifying transparency with new disclosure requirements, in respect to particular practices or the recognition of "particular instruments and transactions"[91]. In the next sub-section, the thesis will have a closer look at those particular practices, instruments and transactions and try to assess the potential effectiveness of Pillar 3 in Turkish banking sector.

3.4.4 Fraudulent Banking Structures: Threats to the Financial Stability

The common-law definition of fraud is the "willful misrepresentation of a material fact that causes harm to a person who reasonably relies on the misrepresentation"[92].

Fraudulent banking carries a negative stigma and connotes much greater deceit than what is implied by usual accounting games. Fraudulent banking starts when the bank is taken over by the new shareholders with the intention to channel the savings of the depositors to the owner's pockets or to recycle those funds in the group companies of the owners of the "target bank". Even though the accounting games like aggressive accounting, fraudulent financial reporting, creative accounting practices or accounting irregularities may be labeled by the international standard setting bodies, a precise definition is still missing for the systemically conducted fraudulent banking activities for the regulators. Terms like "piping" are used in the daily language in Turkey to describe the connected lending or misapplication of bank's funds to the own pocket of its legal owners. In the context of financial reporting, fraudulent financial reporting is the intentional misstatements or omissions of amounts or disclosures in financial statements done to deceive a financial statement audience. The term is used interchangeably with accounting irregularities[93]. A technical difference exists such that with fraud, when the financial information and material misstatements are used for the

90 Quoted in: Gup, E (2004, p. 69).

91 BCBS (2006, art. 808)

92 Boatright, John R.: Ethics in Finance (Oxford: Blackwell, 1999), p. 33.

93 Mulford W. Charles and Comiskey E. Eugene: The Financial Numbers Game, Detecting Creative Accounting Practices. New York: John Willey &Sons, 2002, p. 52.

material and legal disadvantages of the audience. In this context, a pragmatic definition of fraudulent banking is given below:

"Fraudulent banking is a process by which the proceeds of the depositors of a "target bank" are converted to assets financially unsound group companies or dislocated to connected dummy companies established by the owners themselves or by the screening people to overcome of prudential banking requirements and existing accounting framework via misstated financial statements in such a way that the activity fundamentally destroys the overall safety and soundness of the banking system as a whole".

In this respect the wording "target bank" connotes the rational intention of concealment to defraud the bank, and it constitutes the hub of the deceitful actions to be taken by the owners of the bank. These actions are to be likened to that of a dirty smoke, a real "externality" to the very existence of Basel II's aim of sound and safe banking.

The target bank is directly involved in breaching the legal lending limits, taking excessive risks through adverse selection while exploiting the capital basis and deposit protection schemes designed to bypass as much market discipline and misuse the wealth of a nation accumulated on the books of the banking system. The consequence is obvious in Turkey, 22 commercially bankrupted banks were taken over by the Savings and Deposit Insurance Fund (SDIF) in recent years with a non-performing loan of worth 45 billions USD on their books[94]. This means that the 25% of the GNP worth 188 billions USD by the year 2003 was completely lost or transferred to the personal use of the former owners at the defrauded banks[95]. This cost had to be carried over to the taxpayers or refinanced from the funds of the IMF. This is the reason that the regulatory bodies in Turkey have always been cautious, regarding the size and percentage payout from the deposit protection regime. The regulators made it clear at the time that shareholders and managers would not be left unharmed in any bank collapse[96].

While the supranational organizations, the World Bank, the IMF and the BIS are still searching for explanations of the banking crisis, this sub-section will try to gain insight into this fraudulent banking game and highlight the grey areas where accounting is being perverted and where the shareholders with the managers are cutting corners. The fraudulent banking activities involve actively facilitating several structures or by using fraudulent financial reporting in some desired amount and/or in some desired direction.

To promote market discipline, banks must currently make their accounts available for inspection; avoid creative accounting practices and the structures used for "rogue banking" practices. Banks, under the Pillar 3 regime, need to convince the market that they possess the financial staying power. Respectively, the reference to transparency at Pillar 3 should not only be limited to the main risk types, but also include structures banks use for tactical advantage. The latter is much more important than the crude capital ratios of a "target bank".

94 The word "Bankrupted" refers to the intended, covered and rational actions of the owners as given in our definition.

95 Estimation by IMF.

96 Tattersall, John (editor): A Practioner's Guide to, The FSA Regulation of Banking. London: City &Financial Publishing, 2002, pp. 364-365.

For example, establishment of fictitious or dummy companies can be a plan used by the owners of a bank or by the related persons, whose core business activity is solely made up by sucking up the funds of the target bank via misstated or even fictive financial statements. In such case, the bank loans are provided to the "dummy companies", which in reality do not exist. At repayment, new loans are provided or the existing facilities are revolved. In sum, the granted loan amounts are never recovered.

Certainly, there are legal lending limits for extending loans to group companies. In these circumstances, the target bank makes widespread use of the asymmetrical information and finds alternatively a correspondent bank in Europe, which is not aware of the credibility of those dummy companies[97]. For the funding of the dummy companies, "forfeiting" is used and the deal is shown as if the business transaction results from a real export/import facility. The credit lines of the target bank by the foreign bank in Europe are utilized and the target bank provides guarantee facility to the foreign bank in favor of the dummy company and for the "blanc" export/import deal. As expected, the target bank never repays the guaranteed commitment based on the provided loan amount and the funding bank in Europe ends up with the defaulted, non-performing bills of exchanges or drafts of the target bank.

Moreover, the use of back to back facilities requires further supervision and disclosure. In a standard back to back facility, to prevent any capital loss of a subsidiary company in a high-inflation country, the parent company prefers to deposit the capital amount in a bank at home (e.g. in Europe) which has also a branch in the country where the subsidiary is doing business (e.g. D-Chemical Europe and D-Chemical in Turkey). In this way, the capital of D-Chemical is deposited at AA rated bank in Europe and those funds are granted as loans to the subsidiary company in Istanbul. As domestic currency depreciates continuously, the foreign exchange losses including the interest expenses are recognized as non-operational losses under Turkish GAAP and the capital of the parent company is preserved via those back-to-back loans. As cash deposits back up the loans, the foreign bank is not exposed to any counterparty- or country risk from the facility provided. The solvency of the transaction is also refrained from 8% capital adequacy charges. This facility was used as a breakthrough to overcome the Basel I capital rules for international companies, even though the loans were subject to certain level of country risks.

Domestic fraudulent bankers make use of these facilities to overcome the legal lending limits[98].To overcome the legal lending limits, new dummy companies are established with the mutual agreement and consent of the owners of both transacting banks, Bank A and Bank B. Bank A grants loan to the group companies of Bank B and at the same time Bank B provides loans to the group companies of Bank A under same maturity, terms and conditions. As a result, the balance sheets are inflated with phony loans from both banks. On the other hand, the group companies are shown as "credible" and bankable to other banks even though the funded amounts never appear on the balance sheets as assets. Rather, the funds are allocated into the private accounts of the owners,

97 This is reality of what the Pillar 3 stands for.

98 According to the former banks act of No: 4389, Art 2a, "A bank may not incur an exposure to a natural or legal person or a group of connected clients, in excess of twenty-five percent of its own funds".

located offshore. *Through the creation of false or misleading impressions of the intermediary banks, the function of the market is distorted*.

Until now the focus will be redirected from bank's lending activities to the customer side and in particular to the fiduciary transactions. In general, fiduciaries must make full disclosure and the duty of confidence is the basis of these transactions. However, the fiduciary transactions are rearranged in such a way that breach of the fiduciary duties becomes more common in Turkey. Breach of duties takes place when the funds of the customers are diverted to a foreign bank under fictive "fiduciary agreements" or by manipulating the standard account opening forms with falsified payment instructions of the account holders. The funds are channeled to Bank B in form of deposits from the target bank and are reallocated as loans from Bank B to the group companies of the target bank with the same conditions as the deposits. Bank B gets X bps commission from such cash secured loans and the group companies get free of charge funds from the target bank while overcoming the 25% legal lending limits or concentration rules with respect to subsidiaries.

As a result, target bank does not have to reserve regulatory capital by reverting to those funds to a foreign bank and getting that foreign bank to generously provide the offshore loans to its group companies. One additional "benefit" for the fiduciary agreements is the defeat of the reserve and liquidity requirements by the central bank where the target bank creates a sterilized position via fiduciary agreements and received funds are not reported to the central bank.

Creative accounting practices do not only exist at private banks, but also existed at the state owned banks as well. Recent years brought increased awareness of the risks associated with state owned banks. Long ignored problems in state owned or controlled banks were causing major quasi fiscal and credit allocation problems. Often they had to operate under preferential supervisory regimes, thus distorting the competition via incentives provided directly from the state. Besides, funding new acquisitions or of new target banks through the loans provided by the state owned banks were a common and political step in Turkey.

On the other hand, many of the non-performing, doubtful loans at state banks were consciously postponed for the execution of write-downs. By not writing off the unpromising loans, the bank had reported misstated earnings and financial positions.

The structures analyzed here illustrate that financial fraud is not something new. Basel committee responded to these malpractices by setting the formal standards of disclosure to complement the minimum capital requirements and the supervisory review process. The Committee's prescription is a good start for "safe and sound banking", but unfortunately not enough to solve the "rogue banking issue" completely from the records of the emerging markets.

As indicated at paragraph 813 of the International Convergence of Capital Measurement and Capital Standards, "The Committee will consider future modifications to Pillar 3 as necessary in light of its ongoing monitoring of this area and industry developments". In light of the structures disclosed above, Pillar 3 should be extended to prevent against "fraud risk" and the fraud risk should be included in the future risk definitions of the Basel committee as an independent chapter. To deal with

separate fraud risk assessment, there should be encouragement of the implementation of acts such as Sarbanes-Oxley or equivalent auditing standards like COSO[99] rather than leaving the Pillar 3 disclosures to the mandate of local audit companies as documented in paragraph 816 [100].

In Turkey where the international accounting standards have not received widespread official recognition, the exploitation of the banks via their owners or by the investors should be a major concern of the supervisory and regulatory authorities. In the absence of such high level standards, new attempts or conventions to sustain a long term global financial stability will continue to be an immature attempt. Considering the current banking system and capital markets' reliance on the transparency of the financial statements, the effective surveillance by regulatory bodies is a much more important objective than the "capital" itself. If the failure in market confidence is in consequence of the missing leadership, ethics and morality, then there are not enough capital adequacy ratios for rogue banking practices.

Challenges still lie ahead for Pillar 3 as underlying differences in presentation by banks to the market will remain and this will make cross-bank comparisons much more difficult. Key risk issues with regard to market turbulence and fraudulent practices will continue to be outside Pillar 3 disclosures and hence challenges the achievement of sound and safe banking in general.

3.5 Closing Remarks on Basel II Accord

In general, regulators should not act like innocent by-standers that happened to be at the scene. It is important to note that regulators were not just witnesses of the rogue banking practices or market turbulence in Turkey. Rather, their stance was quite "discrete" to the systemic crash of the financial system during the twin crises of 2000 and 2001. This chapter aimed to analyze the spirit of the new accord and its three pillars in the context of fraudulent banking as well. Although the Basel committee does not prescribe extensively against the banking malpractices on the face of the pillar system, it assures to change 'the way banks do business around here' from scratch by changing the "sprit of the capital laws".

One of the early effects of the Basel II framework has been to create a common risk language in the industry. At first sight, it is easy to understate the degree of cultural and behavioral change with the new coming rules, which will be expected at all levels of the bank from board to individual lending officer. Some past behavior patterns that contributed to the banking crises in Turkey are likely to be changed by the new Basel II framework. The extent of change will heavily rely upon the role and attitudes adopted by the regulators, board members and the employees of the banks.

More recently, Turkey has been experiencing a real estate driven boom where profits from real estate lending and increased value of the underlying collateral provide ample capital and justify future lending expansion in the sector. In such circumstances, there is

99 Statement on Auditing Standards (SAS) 99 provides guidance to auditors in assessing the risk of fraud. For detailed information, pls. refer to Arens (et al): Auditing and Assurance Services, Prentice Hall, 2006.

100 BCBS (2006, 816): Pillar 3 disclosures will not be required to be audited by an external auditor, unless otherwise required by accounting standards setters, securities regulators or other authorities.

very little Basel II rules can do to prevent potential crises that may arise pursuant to the changing global liquidity conditions. Rather, banks and supervisors need to continue to be vigilant and professionally skeptical about the future outcome of their portfolio shifts. As a consequence of the forthcoming market failures, if the implementation of Basel II fails, the "deregulation" in Turkey may be replaced by "un regulation", which neither party desires.

In conclusion, Basel II will make the "invisible impact" by changing the "banking culture and behavior" in Turkey and through its new doctrine of risk quantification, supervisory and market disclosure requirements. In this sense, the regulators should be determined to stamp out the sins of the past and adopt an effective execution of the Pillar 2 regime, while banks should be preparing themselves to stand the difficult test of the market discipline constructed under Pillar 3.

Chapter 4: The Quantitative Impact Analysis of Basel II

4.1 Introduction

Basel II marks the inauguration of a decisive moment that will lead to a permanent shake-up of the Turkish financial system. Up until now, the thesis has examined the expected impact of the new framework based on attentive observations and arguments. To test the arguments of the Basel II study further and in order to support the arguments with evidence, Chapter 4 will target to assess how this "moment of truth" is going to affect the Turkish banking sector on a quantitative basis. The metrics of the quantification will be in terms of capital adequacy. It is perhaps helpful to begin with the general objectives of the quantitative impact studies at the international arena and then clarify the differences between the impact studies done on G10, EU and Turkey levels.

4.2 Objectives of the Basel Committee's Quantitative Impact Studies (QIS)

The main challenge for Basel II is the fact that it should find practical answers to immediate issues, which may arise in the use of "best practice methods". The best practice methods include the most sophisticated risk management systems, techniques and products that offer solutions to deal with current banking activities, where "simple" capital adequacy proposals cannot effectively or fairly capture and treat the risks associated. The new financial landscape and its materially distinguished participants are driven by incentives to balance "risk adjusted returns" on capital across the banks businesses. A parallel and comparative situation arises for the "risk focused" supervisors that are driven by "more risk sensitive" capital requirements. As a result, assessing the central implications of the new supervisory framework will be highly complex and the outcomes for individual banks will vary by their risk appetite and the composition of their portfolios. Clearly, there will be significant differences among banks and banking systems across the world. However, the Basel committee is determined to maintain the existing capital levels inside G-10 member states broadly unchanged by the introduction of the new accord. In relation, the main motivation of the Committee has been to ensure the financial soundness within its reach. To envision the road ahead, the Basel committee facilitates "Quantitative Impact Studies", which provide key assessments on the gradual effect of all proposed approaches on the regulatory capital as submitted by the banks. In these studies, banks from different regulatory jurisdictions offer data to estimate further capital requirements or reductions against their existing risk profiles. To understand how the Committee gets to facilitate the QIS, it is worthwhile to outline the objectives of earlier studies as follows:

1. QIS 1 (July 2000):

The first quantitative impact study was carried out right after the dramatic release of the original consultative paper (CP1) in June 1999. The objective of the first QIS was to assess the likely effects on regulatory capital requirements of credit institutions. This was an early attempt to create a snapshot on the relative effect on capital with the new framework and its impact was much less as each successive QIS pursued much more specific objectives and had in turn a more extensive impact than its predecessors[101].

101 Chorafas , D. N. : Economic Capital Allocation with Basel II, 2004, p.13.

2. QIS 2 (April 2001):

Conducted by 138 banks in 25 different countries, the purpose of the study was to assess the impact of different risk weights and other variables on banks' minimum capital requirements. As one might expect, there were substantially different effects across banks. For instance, the capital requirements of internal rating based approaches ranged from an increase of capital by 125% to a reduction of capital by 30%. The variability was on account of the wide range of PD values, which reflected pro-cyclical behavior of ratings and hence capital requirements. The result of QIS 2 set out further proposals in CP2, which led to higher overall minimum capital levels than the Committee was targeting initially. Based on the results of QIS 2, there was no incentive for banks to adopt the more risk-sensitive IRB approaches. Major international banks also raised their concerns over the large gaps between the banks' internal models and the Foundation IRB approach. The response of the Basel committee was the recalibration of the Benchmark Risk Weights (BRW). In November 2001, the Committee made several modifications as follows:

a) LGD estimates were differentiated among various types of collateral and security structures.
b) The BRW formulas did not any longer contain the 1.5 "scaling factor", which was a constant number to increase the required capital irrespective to the credibility of the borrower.
c) The confidence interval for IRB methods was increased to 99.9% of the "Gauss Curve".
d) Asset correlations, namely the cross default specifications of several corporate and SMEs were recognized in the BRW formulas up to a maximum of 20%.

According to Crouhy /Galai & Mark, the proposed recalibration formula resulted in capital savings for SMEs up to 20% compared to that of large corporates with the same probability of default and exposure size. One important conclusion of the works at CP2 was that the current Basel II framework still required more than twice capital for the investment grade companies than the models used by the International Institute of Finance, which acted on behalf of large global banks. Furthermore, the Basel formula required less capital for the non-investment grade companies by a factor of 0.7, which did not reflect the true nature of risks inherent with non-investment grade credit[102].

3. QIS 3 (October 2002):

In October 2002, the Committee launched a comprehensive work involving more than 200 banks from over 43 different countries. The third study had been the "crash test", paving the way for Basel II through recalibration of norms and weights. The objective was to allow the Committee to gauge the impact of Basel II proposals on minimum capital requirements. The study included results on both global and European basis, stretching up to the national impact studies[103]. In sub-section 4.4, the method and

102 Crouhy, M. /Galai, D. / Mark, R. : The Use of Internal Models. In : Scott, H. (ed.) : Capital Adequacy beyond Basel, 2005, p. 212.

103 BCBS (2002, pp.1- pp. 15): Overview Paper for the Impact Study. Basel QIS3 results are available on the internet at http://www.bis.org/bcbs/qis/qis3.htm. European Commission documents are available as: Third Quantitative Impact Study, Review of the Capital Requirements for Credit Institutions and Investment Firms, EU Results.

results of the QIS 3 will be detailed as it provides a global benchmark for the QIS Turkey (QIS TR-1).

4. QIS 4 (End 2004-2005):

Before the release of Basel II framework in June 2004, the Committee gauged its impact based on the QIS 3 data. However, banks' abilities to estimate the parameters for the more advanced approaches of Basel II have improved significantly since then. Furthermore, certain studies conducted by the Committee were based on approximations because data was not always available. Consequently, several member countries launched impact studies on a national level and field tests based on the Basel II framework during 2004 or the first half of 2005.

5. QIS 5 (October 2005):

The Basel committee announced its decision to review the calibration of new framework in spring 2006. In order to ensure that this review was based on the most recent, high-quality data and to evaluate new proposals for the *recognition of "double default" and trading book exposures,* the Committee undertook a QIS 5 between October and December 2005.

4.3 Third Quantitative Impact Study (QIS 3)

Of these five quantitative tests, the most important has been the QIS 3. In the aftermath of QIS 3, many analysts said that the universal banks in Europe passed the capital adequacy test on the strength of their banking books. The results of the QIS 3 paved the way for Basel II to be finalized by the end of 2004.

4.3.1 QIS 3 Methodology

Two possible types of methodology were in principle possible. The first type was the "*complementary samples analysis*", which was based on each participant, submitting the impacts in accordance with one of the three possible approaches (Standardized, F-IRB, or A-IRB). The submitted approach would possibly be adopted at the participant bank by the year 2007. The second type was the "*constant sample analysis*", which was based on having an identical sample of participants submitting impacts for all three possible approaches. The constant sample analysis aimed to identify the differences of impact among the three approaches, in terms of the minimum capital requirements at each participant bank. The results were produced as if the entire system chose a universal approach (Standardized, F-IRB or A-IRB). The Basel committee chose to perform the constant sample analysis. Banks were split between two groups (Group 1 and Group 2) and banks from both groups were invited to present impacts for all approaches. However, not all banks in each group provided data for all the three possible approaches due to technical limitations at banks. So, the results of the

quantitative impact study must be handled and used with care[104]. In the study, "Group 1 (G1)" banks were large and internationally active banks, with Tier 1 capital in excess of 3 billion EUR. "Group 2 (G2)" banks were relatively smaller, generally less complex and not internationally active banks. A total of 188 banks from G10 countries and further 177 banks from 30 other countries participated in the study. Of the 30 non-G10 countries, the participants were 15 EU member states and 5 EU accession candidates including Turkey.

Independent of the Basel committee's QIS 3, the European Commission (EC) performed a study that chose to use the "complementary sample analysis method". Calculations were currently made on weighted averages, where results were weighted by the size of the bank. In this respect, EC's results were regarded more effective in reflecting the accurate impact than the Basel-conducted QIS 3[105]. After the first run of results published in May 2003, the Basel committee decided to make few changes to the proposed rules, which had been included in the Basel committee's third consultative paper (CP3). The effect of these changes was incorporated in the QIS 3, and consequently in the results presented in the next sub-section. EC assisted the Basel committee in the QIS 3 exercise with regards to the results of the EU member states, and the enlarged area comprising banks from six additional countries, which were either acceding or belonging to the European Economic Area. EC published its independent assessment in a separate document. Upon several checks, the quality of the data and analysis were found to be of "good quality" by the Basel committee and of "very good quality" by the EC. The QIS 3 was an imperfect and static exercise, but it provided a sufficiently reliable basis to form deductive conclusions for the implementation and calibration of the new Basel framework.

4.3.2 Results of QIS 3

QIS 3 spawned a wealth of reports aggregated by country and group of countries. Table 4.1 presents a comparison of the results for G-10, EU, EU+6 and Turkey as EU accession candidate.

Table 4.1: Overall Average Change in Capital Requirements compared to Basel I

Impact Group	Standardized	IRB Foundation	IRB Advanced
G10 - Group 1	11%	3%	-2%
G10 - Group 2	3%	-19%	-
EU - Group 1	BCBS 6.0% EU 8.54%	BCBS -4.0% EU 1.9%	BCBS -6%, EU -3.67%
EU - Group 2	BCBS 1.0%, EU -1.07%	BCBS -20.0%, EU -23.8%	BCBS -22.5%, EU -17.0%
Other Group 1&2, EU+6 G2 Banks	BCBS 12%, EU 3.09%	BCBS 4%, -	-
Turkey only	+11.5%	-	-

Source: BCBS (2003, QIS 3 Global Results); European Commission (2003, QIS3 EU results); CEPS Task Force Report No: 51, April, 2004. Turkish results are published by the BRSA in December, 2004 as QIS TR-1.

104 European Commission: Review of the Capital Requirements for Credit Institutions and Investment Firms, Third Quantitative Impact Study: Methodological Annex, July 2003.

105 CEPS Task Force Report 51 (2004, p. 17)

When analyzing and interpreting the data represented in Table 4.1, one has to bear in mind that the variability of the individual bank results inside a specific country was high due to the diversified nature of business at banks. Under the Standardized approach for example, the maximum and minimum values varied from *-15% to 84% for G10 (Group 1) banks*, and for "Other Group" the values stretched *from a -17% to +103%*[106]**.** Consequently, the results should only be used as representative for Group 1 and 2 banks with care.

It is also important to note that the results presented here are from earlier stages of the Basel II implementation, where the published results were at times based on estimates, which then got corrected by the regulators. In addition, certain Credit Risk Management (CRM) techniques were not used completely or the data was missing with respect to some securitization structures. Hence, the overall results were heavily overstated by reason of the missing data on collaterals and the conclusions drawn here should only be used as a snapshot of the conditions at the time of the study.

Furthermore, the final version of the new accord dated from June 2006, introduced a series of important changes to the QIS technical documents. Therefore, the impact studies should be elaborated as the "proof testing" of the different versions of Basel II revised documents.

When the above reservations were set aside, the integrated results in Table 4.1 of the BCBS and the EC were overall in line with the expectations and objectives of the Basel committee, except the aim of keeping the general capital levels same as before inside the current banking system. The reason was obvious as there was not any "level zero effect" on the overall capital levels for any groups of countries and any methodology used. With this exception in mind, the results in the table above could still yield to general statements about the impact of the new accord on different banks in G10, EU and in "Other Country" zones, including Turkey[107].

The key conclusions of the impact studies can be summarized as follows:

1. For large and internationally active banks in Group 1, the message was clear. The memorandum to the global large banks was, "You better choose the most risk sensitive method and save your capital". Both G10 and EU results directed those banks towards even more sophisticated methods to save more capital, if the banks could also validate their framework to the national supervisors. The global results depicted that the opportunity cost of using Standardized approach was the destruction of value on account of 12% additional capital charge. Such cost was truly unsustainable.

2. Group 2 banks (smaller but specialized banks by product, region and client groups) could adopt IRB approaches and substantially lower capital rates down to 23.75%. Table 4.1 indicated countries, whose banking systems had a relatively high stake on IRB approaches because higher proportion of retail business, particularly the mortgage and SME lending facilities would be the

106 BSBC (2003, p. 3): Table 1.

107 Other countries include 24 countries including China, Russia, Singapore, Australia, Tanzania and Turkey, EU+6 includes all new members of the EU.

most capital generating areas of Group 2 banks[108]. In particular, Group 2 banks by definition focus more on domestic and retail markets. The results indicated that institutions with the largest exposure on retail portfolio would tend to take the most significant advantage in reducing capital requirements.

3. The average decrease of capital requirements for EU banks was around 5.3%, ranging from an increase of 2% for banks using the Standardized approach to a decrease of 8.7% for banks using the A-IRB approach in measuring credit risks. For banks applying the Standardized approach, the increase of capital requirements stemmed solely from the operational risk charges, amounting to 10.3%, which were not counterbalanced by possible reductions in credit risk charges. For banks using the IRB approaches, the reduction of credit risk charges far outweighed the additional charges for operational risks. For the smaller EU banks using the Standardized approach, their capital adequacy remained well above 10% even after allowing for the 10.3% reduction. Only a few banks, which make up 0.2% of the total bank assets in the EU, might experience certain difficulties. But raising additional capital or mergers with more capitalized banks could overcome those difficulties.

4. In contrast to the strongly capitalized banks, banks in "Other Country" category fell under the lower end of the capital saving spectrum. The new framework would be too costly for those banks if banks were to adopt the less sophisticated Standardized approach, which would result in an additional capital charge up to 12%, of which 11% was due to the recognition of operational risks.

5. *In the scope of the QIS 3, there were not any Turkish banks using the IRB approach to assess minimum risk-based capital requirements for credit risks.* For Turkish banks, the vote for the Standardized approach would result in a disproportionate decrease of 11.5% in the capital adequacy ratio. The adoption of the Standard approach would alarmingly underestimate the risks in a crisis-prone country, such as Turkey.

6. The results in Table 4.1 also revealed that the capital requirements increased in all sub-groups using the Standardized approach, as opposed to the IRB approaches. Generally, the operational risk calculations would require additional capital allocated by the banks worldwide. This additional capital requirement for operational risks could then be offset by the incentives provided by the implementation of the IRB approaches for the credit risks.

7. The "portfolio contribution" results demonstrated that real capital savings could be achieved in the treatment of credit risks as a result of the diversification benefits attributed to the retail and the SME portfolios. Interbank exposures increased very little by 1-2% while the change in the sovereign portfolio was almost zero.

108 PriceWaterhouse Coopers, 2004, p.34.

4.4 Quantitative Impact Study on Turkish Banks (QIS TR-1)

Quantitative impact studies have not been repeated since the initial QIS TR-1. As the EU accession process for Turkey continued to move in parallel with the Basel II process, the Turkish regulatory authorities directly aimed to establish the linkage with CRD by participating in the Basel committee's quantitative impact studies. The Turkish regulatory body has been directly involved in the QIS 3 process by requesting participation of six private Turkish banks in the quantitative impact studies. Furthermore, as of December, 2004 the BRSA in Turkey released the results of its Domestic Impact Study on the new Basel capital accord. In general, the Basel committee considers it of highest importance that the impacts on minimum capital requirements of the new framework are correctly assessed. To ensure this, the Committee took first steps in relation to both the strict control of the data quality and the methodology used in QIS TR-1. The aim of the QIS TR-1 was to gather reliable information from banks in Turkey on the impact of the new capital proposals on banks' existing portfolios. More than 23 banks of different size, levels of complexity and possessing 95% of the total assets of the Turkish banking sector participated in the QIS TR-1 session. *QIS TR-1 results confirmed that the new Basel framework as in the form of its 2004 version, produced capital requirements broadly consistent with the Basel committee's expectations and objectives.* To conduct the analysis locally, the regulatory body had to accept certain methodology and national discretion, which will be explained in the next sub-section.

4.4.1 QIS TR-1: Main National Discretions and Methodology

In implementing the QIS TR-1, the regulatory body in Turkey made several assumptions and allowed national discretion with respect to the risk weights and the treatment of different portfolios under the new Basel framework, which were as follows:

1. Public entities owned by the Undersecretariat of Turkey were safely assumed to carry the same risk weights as the Treasury of Turkey.
2. Participant banks were mandated to deduct all their investment sums in insurance subsidiaries from their capital base.
3. Participant banks applied a 0% risk weight for exposures denominated in domestic currency, to sovereign debtor or to central bank, including sovereign guarantees and government bonds that were used as collateral. This treatment also included FX-indexed local currency bonds[109].
4. Short-term, interbank claims denominated in domestic currency, were subject to either 20% risk weight or risk weights implied by their external ratings. Also, short-term interbank claims maturing by less than three months were subject to lower risk weights in comparison to long-term interbank claims.
5. Rating Agencies: The accepted rating agencies by the Turkish regulator were the Moody's, S&P and Fitch.

109 FX indexed bonds are actually local currency bonds, whose interest and face values are indexed to a foreign currency. This is an instrument founded by the Treasury of Turkey, to inject foreign exchange based instruments to the market, in times where the forex demands shoots up severely.

6. Retail portfolio:
   The Retail portfolio was broken down into three sub-portfolios: 1) SME retail, 2) Residential mortgages and 3) Non-mortgage retail. Under Standardized and Simple Standardized approaches, SME and Non-mortgage retail portfolios were weighted as 75%. The Residential mortgage portfolios were weighted as 35%.
7. Corporate portfolio:
   a) Corporate portfolio was divided into two sub-portfolios: 1) SME corporate and 2) Non-SME corporate. Most of the existing corporate portfolio was unrated by an external rating agency and the collateralized portion of facilities was less than 15% of the total exposure amount. Hence, the impact of any risk mitigation on the calculation of additional capital requirements would be relatively small.
   b) According to the Basel committee, the unsecured portion of the corporate portfolio was subject to 100% risk weight, whereas the protected part of the portfolio was assigned the risk weight of the protection provider.[110] In that regard, the Committee recognized a new range of eligible guarantors as protection providers, such as sovereign entities, PSEs, banks and securities companies with a lower risk rating than the counterparty. Entities of group companies (subsidiaries and affiliated companies) rated above A- were also recognized as credit protectors. QIS TR-1 took into consideration all these aspects when treating the secured and unsecured portion of corporate exposures.
8. Sovereign portfolio:
   Sovereign portfolio was the largest segment of a bank's portfolio in Turkey, including traded government t-bills and bonds. As Turkey is a member of OECD, these portfolios were weighed as 0% risk to date. Under the new Basel framework, the instruments held under this portfolio were subject to 100% risk, if the instruments were denominated in a foreign currency. The domestic currency denominated sovereign debt instruments were free of any capital charge at national discretion, provided that the supervisor was assured that the coverage of the governmental debt instruments in local currency was robust.
9. Bank portfolio:
   The national supervisor in Turkey was to apply the risk weight implied by the external rating assessment of the bank. Under this option, the unrated banks were to be applied a risk weight of 50%, where a preferential risk weight of a lesser notch might be applied for claims under three months, again subject to a floor of 20%. In the QIS TR-1, claims under three months were generally risk weighted as 20% and the foreign exchange denominated claims on banks, maturing in longer than three months, were risk weighted according to the external rating agencies. Therefore, the bank portfolio was in a more fragile situation in terms of extra capital requirements than before.
10. Equity and related interests portfolio:
    Equity exposures were defined based on the economic substance of the instrument, where the direct and/or indirect stakes on the companies were represented. The equity holdings were subject to risk weighting of 100% or should be deducted from the capital, in accordance with the materiality levels clearly defined in paragraph 35 of the new accord.
11. Trading book positions:
    The trading book consisted of positions in financial instruments and commodities held either with trading intent or for hedging purposes. QIS TR-1

110 BCBS (2006, p. 48).

included term trading-related repo and reverse repo transactions including the derivative instruments, where banks would be required to calculate the counterparty credit risk charge for OTC derivatives, repo-style and other transactions booked in the trading book. The concept of "counterparty risk" was introduced to the Turkish banking and regulatory practice for the first time via Basel II[111].

QIS TR-1 can be regarded as the equivalent version of QIS 3, in terms of its methodology, except the impact study of IRB approaches was not feasible for Turkish banks at the time. Therefore, the results in QIS TR-1 were given for the standardized approaches; 1) Simplified Standardized approach (SSA) and 2) Standardized approach (SA) as referred in the Table 4.2 below. The core element of the QIS TR-1 was a comparative analysis of the changes in risk weighted assets (RWA) resulting from the switch-over to the new framework introduced by the Basel II accord.

Table 4.2: Approaches used in QIS TR-1

Level of the Method and Risk	MARKET RISK	CREDIT RISK	OPERATIONAL RISK
SIMPLE		Simplified Standardized Approach	Basic Indicator Approach
MODERATE	Standardized Approach	Standardized Approach	Standardized Approach
			Alternative Standardized Approach
ADVANCED	Internal Models (Value-at-Risk) Approach	Foundation Internal Ratings Based Approach	Advanced Measurement Approach
		Advanced Internal Ratings Based Approach	

Source: BRSA, QIS Assessment Report, December, 2004.

SSA could be perceived as the "pure" continuation of the old Basel accord, as the risk weighting for all kinds of risks associated with corporate credit were weighted as 100%. The rating of the obligor was based on the scoring of the ECA, which was scaled from grade 0 to 7. The degree of granularity and accuracy in capturing credit risks and weights were significantly missing with the old accord as discussed in Chapter 3, sub-section 3.2 "Limitations of Basel I". Furthermore, the old accord did not recognize any currency or maturity mismatches on the securitization structures. For the mortgage backed commercial loans, there were not any advantage as the old accord did not distinguish between risk mitigating factors in its capital calculations.

SA on the other hand was relying on the rating of the obligor by reputable external rating agencies, which were accepted by the Turkish regulatory body. In fact**,** one of the most striking points of the SA introduced by Basel II was the consideration of the external ratings for the calculation of risk weights for outstanding exposure types. In addition, SA in the new Basel framework would define the exposure at risk as the residual credit risks after risk mitigations have been accounted for. For the usage of risk mitigations, there were two methods: 1) Simple method and 2) Comprehensive method[112]. Please also refer to Chapter 3, sub-section 3.4.3.2.1, "Standardized Approach" for the two methods. In sum, all kinds of credit risk mitigation instruments and techniques were recognized in the capital charge calculations. Although the IRB approaches were not included in QIS TR-1, the comparative analysis between the QIS

111 QIS TR-1 Evaluation Report of BRSA, 2004, p. 34.

112 The simple method of the risk mitigation is not to be confused with SSA method for capital calculations.

TR-1 and QIS 3 would be able to highlight the pitfalls in the Turkish banking sector. In the next sub-section, the thesis will analyze the results of QIS TR-1 compared with the QIS 3.

4.4.2 Results of QIS TR-1: A Comparative Analysis with the QIS 3

This sub-section will aim to assess the impact of Basel II on the capital adequacy requirements of the Turkish banks. According to the results of the QIS TR-1, as depicted in Table 4.3, Turkish banks differ significantly from the "Other Country" banks in the QIS 3.

Table 4.3: Contributions to Changes in Cross Country Capital Requirements according to Standardized Approach in Core Portfolios[113].

Portfolio	G 10	G 10	EU	EU	Other	Turkish
	Group 1	Group 2	Group 1	Group 2	Group 1 & 2	Banks
Corporate	1%	-1%	-1%	-1%	0%	2.04%
Sovereign	0%	0%	0%	0%	1%	3.05%
Bank	2%	0%	2%	1%	2%	0.46%
Retail	-5%	-10%	-5%	-7%	-4%	-0.68%
SME	-1%	-2%	-2%	-2%	-1%	-2.80%
Securitized Assets	1%	0%	1%	0%	0%	0%
Other portfolios	2%	1%	2%	-1%	3%	5.93%
Overall credit risk	**0%**	**-11%**	**-3%**	**-11%**	**2%**	**8.00%**
Operational risk	10%	15%	8%	12%	11%	3.50%
Overall change	**11%**	**3%**	**6%**	**1%**	**12%**	**11.50%**

Source: BCBS, BRSA, EC

The results of QIS TR-1 indicated that aggregate minimum risk-based capital requirements would increase 11.5% for the 23 participant banks when switching from the Basel I to a Basel II framework. This means that Turkish banking industry was faced with an overall increase of 56.7% in risk weighted assets coupled with a decrease of capital adequacy ratio down to 17.33% from 28.84%".

In the Standardized Approach (SA), the capital requirements for credit risk were adjusted significantly at each category listed above. Accordingly, the new credit risk-based capital requirements in Basel II would lead to an increase of 8% across all participant banks in Turkey. *When the operational risk requirements were taken into consideration, the increase would stretch up to a sizeable 11.50% in Turkey.* In essence, the increase in the capital requirements with SA was due to higher credit risks in Turkey than in "Other Country" banks in QIS 3. Naturally, higher credit risks led to the increase of risk weighted assets, whereas the "Other Country" banks were more impacted by the introduction of operational risk charges in the SA of the new Basel II framework. The reason for lower operational capital requirements for Turkish banks was due to lower operational costs, relatively less weighting of the operational costs in the overall risk weighted assets and the lower profitability of the Turkish banks, which

113 The countries include in this category are: Australia, Brazil, Bulgaria, Czech Republic Chile, China, Hong Kong, Hungary, India, Indonesia, Korea, Malaysia, Malta, Norway, Philippines, Poland, Russia, Saudi Arabia, Singapore, Slovakia, South Africa, Tanzania, Thailand and Turkey

produced lower gross incomes relative to their competitors in the world. The impact of the Basel II framework on Turkish banks can be outlined more specifically as follows:

4.4.2.1 Impact on Specific Portfolios

The main impact observed in the recent studies was with regards to the minimum capital requirements of the equity portfolio and the trading book positions. In particular, Basel II introduced the sovereign portfolio risks associated with extensive amounts of Turkish Eurobonds, which were on the trading books of banks. Substantial amounts of Turkish Eurobond positions had to be reported during the QIS works and such positions and transactions caused severe increases in the capital requirements of the banks. Even though the domestic currency governmental debt instruments were weighted as "zero risk", the existence of Turkish Government Eurobonds denominated in USD and in EUR could not be overlooked. As such, foreign currency denominated positions were significant risk contributors at the portfolio level and acted as main stimulant for additional capital requirements. QIS TR-1 revealed that the capital requirements of the sovereign portfolio and the trading book consisting of those debt instruments increased by a factor of almost 8.7 and 2.5, respectively.

Under SA, a decrease of risk weighted assets was only pronounced for the retail and SME portfolios, because the risk contributions were traditionally much less leading to much smaller capital charge to the average capital adequacy ratios. Although Basel II decreased the risk weighting of retail assets down to 75%, the effect on the mortgage backed retail portfolio on the capital savings was relatively low, as the mortgage backed loan market in Turkey was not as developed as in Europe. Hence, the impact of capital savings for more developed markets than Turkey was significantly higher, where the mortgage backed residential retail loans in those markets benefited from a low risk weighting of 35% with the new accord. Peer group banks in the QIS 3 reflected significant reductions in capital requirements for retail and SME portfolios, when those portfolios were bundled together.

While bank portfolios benefited from the use of external agency ratings, the increase in risk weighted assets was due to the recognition of short term domestic currency money market receivables for the first time. In the new framework, those transactions were to be assigned a risk weight of 20%. As a result, the capital requirements of the bank portfolio increased by almost 0.5% compared with the old accord.

4.4.2.2 Impact on Competition

Under the Basel I accord, Turkish banks had been quite inefficient in the intermediation of deposits into corporate loans. Besides the inefficient lending practices and pricing techniques at the facility level, each facility was conducted with marginal amounts of spreads. This of course hardly justified the finest efforts of carrying a corporate loan book with 100% risk weight. Basel II is expected to offer an incentive for capital relief when banks apply "best practice" risk management and encourage more portfolio sensitive pricing at the beginning of transaction origination. More "risk sophisticated banks", which are quick to optimize their portfolios with the new rules, will obtain a significant advantage in profitability and competitive position over the late adopters, who may end up operating under a higher capital charge for the same credit risk profile. The better pricing methods based on RAROC models that offer more efficient

allocation of capital will likely increase the take-over and consolidation activity among Turkish banks as well as foreign bidders, mainly from the European Union.

4.4.2.3 Impact on Loans due to Lack of External Ratings

Under the Standardized approach to credit risk, it is suggested that all exposures to unrated sovereigns, banks and corporates are covered with a 100% risk weight. Very few companies in Turkey have external agency ratings; consequently, an external ratings-based approach does not promise much of a capital relief for Turkish banks in comparison to Basel I at this moment. As the strongest Turkish banks are currently rated from B to B+, the lack of ratings for corporates may actually be a blessing in disguise. If rated, most corporate borrowers and particularly SMEs may come out below B- and therefore carry an even higher 150% risk weight. At the same time, corporates and SMEs that do not have an external agency rating would have less capital charge under the SA.

The initial feedback from the large private banks indicated that many would lean towards adopting IRB approaches for credit risk because QIS TR-1 was conducted under SA, which meant an immediate increase of 8% for credit risk-based capital requirements. Since most exposures were unrated and hence carried a 100% risk weight, the IRB approaches could generously provide capital relief for banks with an internal credit scoring system. The major private Turkish banks have already implemented credit scoring systems and are regularly calculating explicit one-year probability of default (PD). The most appropriate approach for banks that have already obtained credible PD estimates from their customer databases would then be the F-IRB, where internally generated estimates of PD are combined with supervisory values for other factors, such as LGD, EAD and Maturity. Given the data, it might even be feasible to adopt the A-IRB where internal LGD, EAD and Maturity, in addition to PD estimates would be calculated.

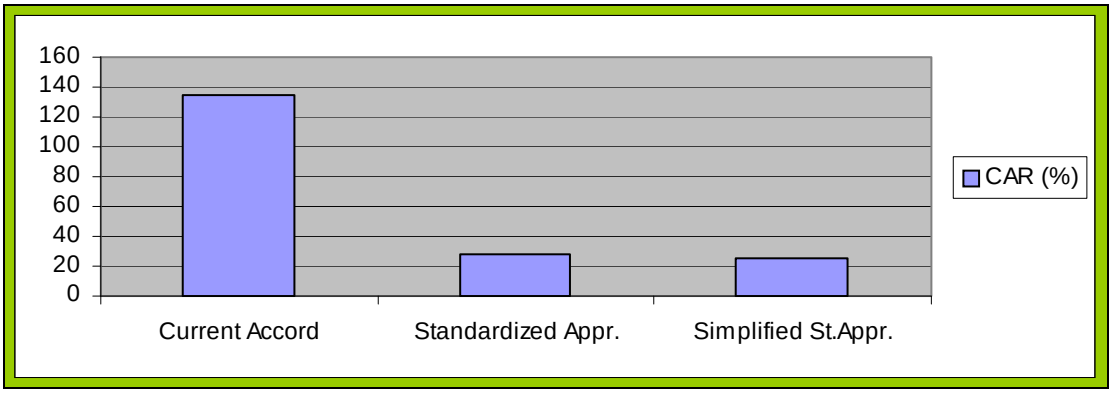
4.4.3 Effects of Basel II on a State Owned Bank in Turkey (QIS TR-1)

This sub-section will examine the drastic effects of Basel II proposals on minimum capital requirements of a state-owned bank, namely HalkBank. Halkbank is specialized on SME (small and medium sized enterprises) lending and hence, the lending policy and practices will be highly influenced by the new requirements under the new Basel framework when measuring the credit risks associated with SMEs. In particular, the QIS TR-1 assessed the capital adequacy ratio of Halkbank, based on its lending policies and portfolio management systems and the impact of the large marketable securities position on capital charges. QIS TR-1 also revealed key insights with regards to the credit risk-based capital requirements on SME portfolio with the Basel II accord.

QIS TR-1 used figures in the Euro denominated and inflation-adjusted financial statements of Halkbank dated June 30, 2003. As depicted in Figure 4.1, capital adequacy ratios of Halkbank decreased dramatically from 134.9% under the Basel I accord to 27.7% and 25.6% under Standardized approach of the Basel II accord and Simplified Standardized approach, respectively. The slight difference between SA and SSA was as expected due to the assignments of risk weights to banks by external rating agencies in the SA. The overall effect of Basel II on Halkbank's capital adequacy ratios was enormous, according to the QIS TR-1.

According to the QIS TR-1, Halkbank recorded a vast amount of pronounced increase in its risk weighted assets, resulting in an eventual decline of its capital adequacy ratio by 79.4%. Importantly, the main source of the capital erosion was on the site of its credit portfolio, which was mostly composed of loans to sovereign and sub-sovereign institutions. Other sources of reduction in capital adequacy ratio were the application of the operational risk- and the trading book capital charges. The negative marginal contribution of the credit risk assets to the capital adequacy ratio was about 99.6 points overall. Besides the sovereign portfolio, the SME retail and SME corporate portfolios also contributed to the decline of the capital adequacy ratio. Unlike its peers in the Turkish banking system, QIS results of Halkbank stood out to a greater extent for its specific portfolios.

Figure 4.1: Change of Capital Adequacy Ratio under Basel I, Standardized and Simplified Standardized Approaches



Source: BRSA, QIS TR-1, December, 2004, Halkbank's QIS Reports.

The main results for Halkbank emerging from the comparison of Basel I and Basel II accords in QIS TR-1 are outlined as follows:

4.4.3.1 Impact on Sovereign Portfolio

The largest and most notable increase in the risk weighted assets related to credit risk was kept in the sovereign portfolio. According to Basel I, the membership in the Organization for Economic Cooperation and Development (OECD) was the ground for determining a country's creditworthiness. Therefore, as in the case of Turkey, OECD membership generously served the Turkish banks and the governmental institutions to enjoy lower borrowing costs due to the preferential capital charges under Basel I accord. Under the new framework and in compliance with the national discretions[114], a lower risk weight could be applied to exposures extended to sovereign debt denominated in domestic currency and funded in that currency. By national discretion, Halkbank applied a risk weight of "0%" to domestic currency exposures held as government bonds. After the economic turmoil in February 2001, the Turkish Treasury exchanged the incurred losses of Halkbank completely with the illiquid, non-marketable government securities. As of June 30, 2003, the outstanding balances on Treasury bills and government bonds portfolio of the bank were absorbing 77% of its total assets. The breakdown of the sovereign portfolio of Halkbank displayed that the

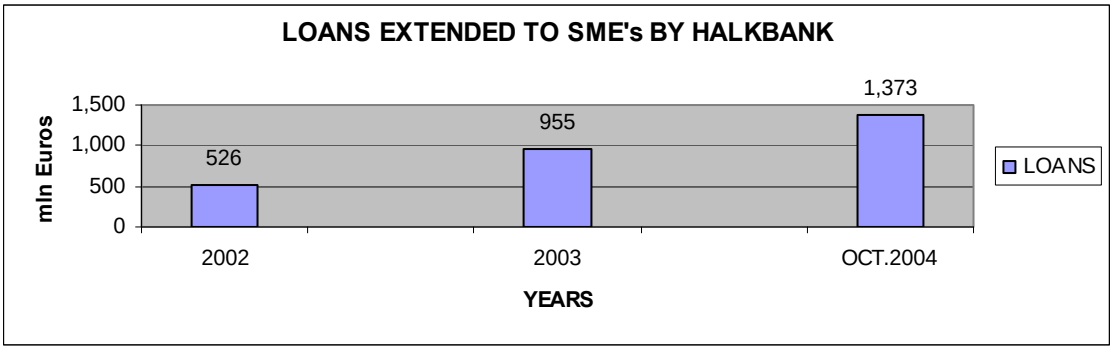
114 Refer to section 4.4.1, "QIS TR-1 Main National Discretions and Methodology".

government securities held in foreign currency were about 31.1% of the total securities portfolio of the bank. As the new framework obliges the foreign exchange denominated sovereign debt instruments to charge extra capital, the existing sovereign portfolio's contribution to the decrease in the capital adequacy ratio was highest in relation to the other asset types.

4.4.3.2 Impact on SME Portfolio

Halkbank was founded to extend loans to artisans, tradesmen and SMEs especially in economically underdeveloped parts of the country. Loans to SMEs by Halkbank had been increasing over years as depicted in Figure 4.2. Under the Basel I accord, loans extended to SMEs consisted of 9.8% and 69.1% of Halbank's total loans and total risk weighted assets related only to the credit portfolio, respectively. Thus, SME loan portfolio had the second largest percentage share in the credit risk weighted assets in QIS TR-1 results of Halkbank and absorbed substantial amounts of capital.

Figure 4.2: Loans Extended to SME's by Halkbank



Source: Halkbank

As the above graphics suggests, 73.8% of the total SME loans are subject to 50% risk weight under the old accord. These SME loans are collateralized to a great extent with real estate mortgages. The rest of the portfolio is secured with disallowable collaterals such as personal guarantees and mortgages with lower priorities. Therefore, the existence of weak credit risk mitigants in terms of Basel II results in the higher amount of risk-weighted assets on the SME portfolio.

According to the Basel II accord, exposure on retail claims may be risk-weighted at 75% bucket. In implementing the new Basel framework, 62.8% of the SME loan portfolio was subject to 75% risk weight, especially due to the SME loans treated as retail and the amount of the total risk weighted assets of the SME portfolio increased by 62.3% compared to the old accord. In compliance with the directives of BRSA, Halkbank slightly benefited from this national discretion by including only 2.0% of the SME loans into the 50% risk weighted assets.

4.4.3.3 Impact on Retail Portfolio

The percentage share of the retail non-mortgage portfolio within the risk weighted assets under the new accord was another important result that came out of the QIS TR-1 for Halkbank. Under Basel II Standardized approach, retail portfolios benefited from a lower risk weight of 75% compared to the generally applied 100% risk weight under Basel I. To qualify as retail credit, all claims have to be on individual person/s or small

businesses, the maximum exposure to counterparty must be below EUR 1 million, and the pool must be sufficiently diversified.

4.4.3.4 Impact on Bank Portfolio

Claims on banks are risk weighted differently under the new capital regime, as the option to use external agency ratings for rated banking counterparties was introduced. BRSA in Turkey decided to implement the so-called "Option 2" during the QIS exercises. Please refer to Chapter 3, Table 3.2. for the options. Since under Option 2 risk weights of bank claims depend on the rating of the respective bank, only banks with a double-A rating or higher ratings enjoyed the 20% risk weight. Other investment-grade banks (i.e. banks with a single-A or triple-B rating) as well as unrated banks will have a 50% risk weight. Also according to the national discretion announced by the BRSA, claims on banks with an original maturity of 3 months or less, funded in the domestic currency are 50% risk weighted. As in comparison to the old accord, the risk weighted assets for claims on banks increased by 25.8% in the Standardized approach.

4.4.3.5 Impact on Corporate Portfolio

As far as Halkbank's corporate portfolio was concerned, corporates have an undifferentiated risk weight of 100%, regardless of their credit quality. Under the Basel II Standardized approach, credit assessments of the corporate claims determined by external rating agencies can be risk weighted with the help of external ratings. The standard risk weight for unrated claims on corporates is 100%. At national discretion, the BRSA decided to implement 100% risk weight, regardless to external ratings of corporates, as if the external ratings would not have any material impact on the corporate portfolio by switching from the old accord to Basel II.

4.5 Closing Remarks to the Quantitative Impact Analysis of Basel II

The results of the QIS TR-1 analyzed in this chapter suggest that a multitude of factors contributed to the overall drop and dispersion of risk-based capital ratios in Turkey. Those factors may be summarized as follows:

1. *Recognition of the sovereign risk* for the first time in Turkey, coupled with the sub-investment grade rating disadvantage of Turkey.
2. *Recognition of the huge amount of government debt instruments* in the trading books of banks, which result in additional capital charges.
3. Acknowledgement and *recognition of the non-performing, past due loans* consistently as sub-prime rated borrowers. As the banking books of the Turkish banks are loaded with those loans and the provisioning was not materially affected, this standard will be a significant capital driver in the near future, for those banks, which do not want to disclose or eventually take any corrective action for the resolution of bad debt portfolios.
4. Awareness of the *existence of higher risks* associated with the corporate portfolios, where there are usually exposures related to counterparties with credit quality below B-.
5. Missing *internal and external ratings* of Turkish banks. There are still banks on the market which are not rated by Moody's or S&P.

6. *Insufficient and ineligible collateralization*, especially for non-SME corporate and non-mortgage retail loans. This fact will have very strong influence on the loss given default figures at the facility and portfolio levels.
7. Existence of *higher operational risks* especially for the public banks in general.

All of these factors will cause for a concern in consideration of the pre-Basel II capital adequacy ratio level, which was 28.84% in Turkey. The impact study gives us a hint and the ratio will drop to 17.33% level with the introduction of Basel II. All in all, to sustain the pre-Basel II ratio level, Turkish banks have to inject more than 10 billions EUR of new capital into the system. This fact currently makes the supervisors relatively reluctant about the fast implementation of Basel II in Turkey. This detail also implies that there are not any incentives for banks in Turkey to adopt the new Basel framework, if banks in Turkey preferably choose to remain with the Standardized approach for the calculation of minimum capital requirements. The optimal approach may depend on individual bank's profile, but the perception in the market suggests that the biggest banks are the most likely to move towards more sophisticated IRB approaches, as they want to preserve capital due to competition. In the case of state-owned banks, the negative effects of Basel II Standardized approach are apparently disastrous. The state-owned banks require immediate, long lasting solutions to stop the erosion of their capitals.

During the QIS TR-1 analysis in this chapter, sufficient evidence was found to suggest that the price or availability of external capital in form of syndications and bond issues might be affected by the new Basel capital regime. In particular, sovereign syndications and bond issues will be the ultimate candidate to experience adverse transitional effects where higher margins are likely to be imposed for Turkish sovereign risk. Furthermore, some experts have expressed significant concerns that the new Basel capital regime will also lead to a sharp increase in borrowing costs for banks in Turkey. This chapter has been in line with these observations, even though the defendants of Basel II Standardized approach continue to claim the opposite. Especially, for the syndicated loan market, where Turkish banks are most active on the funding side, higher margins and decreased liquidity may severely affect the intermediation by the global banks as well. As long as the country external ratings do not get any better, Turkish banks may continue to suffer from this "country risk" disadvantage under the new regulatory environment and the contracting liquidity conditions.

Nevertheless, the QIS TR-1 encourages one to strongly think about the following facts. The impact of Basel II on an individual financial institution will depend largely on the composition of its business, and the approach that it eventually takes to the calculation of regulatory capital. Banks that engage generously in lending to SMEs and those that lend to retail customers should see falling capital requirements for credit risk. These reductions will be material in some cases, but partially offset by an additional capital requirement for operational risk. The part of the banking sector, which is dominated by the institutions that engage in retail lending, can expect minor falls in the regulatory capital, which will support the soundness and safety principle of the Turkish financial system. Further improvements can be achieved by shifting towards more sophisticated approaches of Basel II, namely the A-IRB and F-IRB. By becoming more risk sensitive in the calculation of capital requirements, banks can also opt to facilitate credit risk mitigating techniques, if the competitive edge is to be created and sustained. If banks are determined to firmly remain in the business of "sovereign debt and governmental

financing", they are most likely to witness increased merger and acquisition activity in Turkey. In fact, the share ownership of Turkish banks by foreign banks, in terms of total assets has quadrupled, since the finalization of the QIS TR-1 in 2004.

One caveat to the QIS TR-1 was that few institutions had the systems in place to identify comprehensively those exposures that would be eligible for lower capital requirements pursuant to credit risk mitigation. Consequently, QIS TR-1 submissions of exposures would have been as if they did not benefit from any collateral or credit protection. The BRSA expects that closer to the date of Basel II compliance, systems will capture the information necessary to permit the assignment of lower risk weights to such exposures. Further discussions with banks also indicated that when a few institutions lacked data to adequately estimate parameters, they sometimes choose a conservative estimate, potentially creating an upward bias in QIS TR-1 results. Therefore, the information on the erosion of capital may be hindered in the future, when the potential loss given default would be decreased by the mobilization of stronger guarantee schemes.

After reviewing QIS TR-1 results, the BRSA announced a "Road Map" and established "a cooperation platform" between the banks and the administrative organs at the heart of the regulatory units. In 2005, BRSA officially declared a program to implement the proposed framework along an extended timeline and with additional safeguards. The agency recognized that the results of QIS TR-1 would raise "minor" concerns if the new capital requirements were to be implemented immediately. However, as emphasized at the outset, these results were based on best efforts by the banks and without benefit of either a definitive set of proposals or meaningful supervisory validation of the institutions' systems. Experience during the multi-year transition period to Basel II will provide better basis to assess quantitative implications of and make adjustments to the new Basel framework, or make other changes to minimum regulatory capital requirements, as appropriate. Some banks will not find the transition easy as the implementation costs are likely to be high and will be borne – in the first instance at least – by the financial sector. Some of the benefits, in terms of risk management, will be accrued throughout time, and the planning to progress towards more sophisticated approaches will ensure a brighter future for the Turkish banking sector. Some big banks have already started to take serious actions in developing IRB models and systems, but the question remains to be the same with regards to the validation framework. In the next section, the thesis will propose practical solutions for the "best practice" IRB implementation.

SECTION III: Implementation of the Basel II IRB Approaches

Chapter 5: Implementing the Internal Ratings-Based Approach and Its Organizational Foundations

5.1 Introduction

This section represents further implications of the Basel II accord on banking supervision and capital requirements when implementing the new accord in an emerging market banking system, such as in Turkey. As initially seen from the results of QIS TR-1, *"The Turkish banking industry is faced with an overall increase of 56.7% in risk weighted assets coupled with a decrease of capital adequacy ratio down to 17.33% from a level of 28.84%"*[115]**.** This *"free flow of capital adequacy ratio"* within the context of a second quantitative impact stage is reemphasized again by a more up to date study (QIS TR-2), which was completed as of June 2007, and the outcome was not any different than the former studies, namely the QIS 3 and QIS TR-1. The results point towards a terrain loss of the capital adequacy ratio down to 13.68% from the existing level of 19.31% as reported in the second half of 2007[116]. The message of the second quantitative impact study indicated an erosion of capital by a factor of 30% if and when the Basel II Standardized approach is implemented. This means that one out of three banks will be faced with the complete loss of its capital in the case of Basel II's SA.

In ordinary banking terms, the restoration of the capital losses should be compensated through either re-pricing of risks or by the injection of fresh capital, if the banking system is to remain at the current capital adequacy ratio of 19.31%. In this respect, the current ratio may address the ambiguity of "over-capitalization" for the Turkish banks, whereas the capitalization rate of the Turkish banks should be interpreted within the context of existing higher systemic risks in Turkey. After all, the standard "cook ratio" of 8%, prescribed in the former accord may not be adequate to sustain a "safe and sound" banking system in Turkey. Hence, the Turkish banking system should not lose the chance of adopting more efficient and effective capital measurement and allocation methods, including the adoption of IRB approaches. Having said that, it is important to note that the IRB approaches themselves need to be recalibrated and crash tested in accordance with national discretions and globally during the testing phases of Basel II implementation. Only more risk sensitive and more precise capital saving methods may ensure the preservation of capital inside the Turkish banking system.

Contrary to the resistance towards the adoption of IRB approaches as voiced by the participant banks in QIS TR-2, the Basel QIS 5 as of June 2006 reported that 382 financial institutions in more than 32 countries in the world would confess themselves to the rituals of an IRB approach[117]. One can see, therefore, that many more banks around the world are aiming to adopt one of the IRB approaches, in comparison to what was previously reported within the results of the QIS 3 as discussed in Chapter 4. Even though the minimum standards and requirements are more extensive for the adoption of

115 QIS-TR Evaluation Report of BDDK (2004, p. 34).
116 BRSA Quantitative Impact Study II, 2007, p.5.
117 BIS: Quantitative Impact Study 5, 2006, Basel

IRB approaches than the Standardized approach and the bar to cross over is raised to higher levels with the revised Basel II documents, ensuring those standards and requirements is becoming one of the key goals and objectives in the eyes of the Turkish risk managers and regulators.

Putting IRB approaches into practice is easier said than done and hence represents a big challenge for the industry representatives and regulators in Turkey. The industry representatives are stretched even further when considering the timetable and the road map to Basel II as prescribed by the regulators in Turkey. Even though the shift to IRB approaches was envisaged as of March 2006, the timetable for a possible kick of a "regulatory validation" is postponed until the beginning of 2009[118]. In this respect, this "bonus time" for a possible switch to one of the two IRB approaches allows the banking industry to make sound conclusions for a "make or buy" decision for more sophisticated models and applications than internally available. This in turn creates a kind of "comfort zone" for the regulators to be a bit more open and transparent about their plans for future supervisory and regulatory activities in respect to the finalization of IRB approaches.

Up to the present moment, the quantitative impact studies discussed in Chapter 4 confirmed the necessity of IRB approaches for more risk sensitive measurement and allocation of capital. The author in addition believes that, under the systemic conditions in Turkey, the biggest challenge will be the detailed planning and transition of the existing organizational structures at banks. Respectively, this chapter will offer guidelines and suggestions for the "best practice" implementation at an organizational level. The requirements under Pillar 2 are not just meant to suggest that existing mechanisms, which have primarily met the fundamental needs of the existing institutions over the years, necessarily need to be immediately replaced. However, more than adequate processes need to be in place to ensure Internal Capital Adequacy Process (ICAAP) to be embedded in the institution's business and organizational structures. ICAAP should not simply be regarded as an add-on that permits both supervisory and management functions to 'tick a box' and indicate that supervisory expectations nominally have been met. At the same time, it is not meant to be simply a "validation process" for the models and applications to be used. Rather, *Pillar 2 is regarded as an itinerary to convince the regulators that the bank has established a robust and safe framework, organizational processes and structures to measure, manage and mitigate all types of risks*. On the other hand, the result of the Supervisory Review and Evaluation Process (SREP) may in fact lead to additional capital requirements on top of Pillar 1 determined "threshold capital", if the bank's organizational framework is not found to be adequate and effective to deal with the nature of banking risks, including portfolio-level concentration risks compared to its peers. As a result, the progress towards the IRB approaches will lead to the direct streamlining of the risk management processes at both "facility and portfolio levels".

This chapter will aim to contribute to the fundamentals of IRB implementation within the boundaries of the following key principles:

118 The decision was indicated very recently at the internet site of the BRSA.

1. The Risk Management Wholesale (RMW) reflects "client focused" business strategy. Business units are responsible for the selection of clients and managing all of the business activities with clients within approved limits.
2. RMW sustains high level of risk expertise via industry analysts and loan product specialists.
3. Though integrated, RMW diligently maintains its independence from commercial functions by the acceptance of the fundamental principle of "segregation of duties".
4. The approval of any risk sensitive product or solution should require the approval of authorized committees and direct involvement of risk professionals, conditioned upon the effective implementation of information and control systems to manage the associated risks.
5. Risk Management structures, policies and procedures should be as transparent as possible, based on consistent principles, in written form and well documented.
6. *Risk and reward from a transaction are borne by the same business unit***.**
7. Counterparty ratings are an indispensable tool for managing and monitoring credit risk of the bank, both at counterparty and portfolio level.

In consideration of the three pillars in the Basel II accord, the new structure proposed in this chapter provides a high level overview of risk management function for the Wholesale Client Strategic Business Units (WCS) and is divided into the following sections:

1. Key Issues in Implementing the IRB.
2. Organizational Backbone of Basel II Compliant Risk Management Framework.
3. The Role of the Group Risk Management functions.
4. The Role of Portfolio Management functions.

5.2 Key Issues in Implementing the IRB

5.2.1 Overview of the Basel II Requirements for the Implementation of IRB Approaches

The transition to IRB approaches basically requires a bank to demonstrate to its supervisors that its ongoing systems may differentiate and quantify risk in a consistent and reliable way at the outset and on an ongoing basis[119]. A qualifying IRB system, which comprises of methods, processes, controls and data collection through IT systems, should differentiate between the risk of borrower default (obligor risk) and the transaction-specific default, called facility risk. A "rating system" is required for the assessment of credit risk, the assignment of internal ratings and the quantification of default and loss estimates. Before discussing internal rating systems in detail, it may be useful to summarize some of the key qualitative prescriptions from the Basel II accord[120].

The Basel Committee on Banking Supervision and the European Commission issued bank solvency directives in which, under the Foundation and Advanced IRB approaches, counterparty ratings are a key factor to determine the minimum regulatory

119 BIS, Framework (2006, parag. 388)

120 Saita, F.: Value at Risk and Bank Capital Management – Risk Adjusted Performances, Capital Management and Capital Allocation Decision Making. London: Academic Press, 2007, p. 84, derived from BIS Framework, 2006.

capital that a bank has to maintain for credit risks. Consequently, all counterparties must be assigned a counterparty rating. Moreover, the information on which the rating is based upon, must be stored and that rating must be validated. As a consequence, sophisticated rating systems are needed to assist in the assignment of ratings for decision making purposes with respect to the management of credit risks.

5.2.1.1 Rating Systems and Approaches to Rating Assignment (Basel II Accord pp. 394-421)

The focus in this thesis is the measurement of the credit risks. Credit risk encompasses all forms of counterparty exposure in relation to *lending, trading, hedging, settlement and other financial activities*. Counterparty ratings embody:

- An assessment by the bank of the risk that the counterparty will default or will be unlikely to pay with respect to its financial obligations to the bank.
- All the information such as financial, macro-economic, industry and management-related etc. that the bank has regarding its client is relevant for this risk assessment.

The main purpose in the establishment of internal rating is to find an "indicator of the client's creditworthiness" at the counterparty level. At a portfolio level, internal ratings are used to report the general trends regarding the quality of the bank's credit portfolio. Furthermore, ratings are necessary for credit portfolio models, which help in the determination of economic capital and subsequent risk-adjusted profitability of the portfolio.

It is possible to use multiple rating systems for different industries/market segments and asset types provided the criteria for assigning a borrower to a rating system is documented and appropriate. For example, the scope of these models can be divided into as follows:

- Corporate models for wholesale clients and diversified groups
- Non-corporate global rating models consisting of a bank, insurance, finance, asset securitization conduits, project finance, sovereigns, sub-sovereigns and for trade and commodity finance facilities
- Regional rating models for specific client groups
- Rating models for SME clients

According to the Basel II requirements, "Ratings should incorporate all available relevant information. Scoring or other quantitative models can be used, but sufficient human oversight is needed to check that all relevant information, even outside the scope of the model, is properly used. Written guidance is needed on how models and human judgment may be combined".

However, in certain cases, there are "not any or very limited financial information" available for a financial assessment. Although it is not possible to use a rating model in such cases, a uniform verbal scoring must be assigned to each exposure. Again if there is not any or too limited financial information available, but where an external agency rating is available, the mapping between the internal scoring and the external agency

rating should be executed. If there are two different external agency ratings, then the lower of the two should be taken.

An interesting case might be with respect to the *"No or Limited Financial Info – but available Group Support"*. In this case, an upward adjustment can be applied if the counterparty is part of a group or has a shareholder that is likely to support the counterparty to fulfill its financial obligations. The likelihood of support must be backed-up by tangible evidence and any proposed amendment to the initial rating should be explicitly explained in the credit proposal.

In case of limited information to determine the rating of an obligor, and there exists a "third party guarantee", which is given for the counterparty, a maximum score should be provided at a level, not exceeding the "acceptable risk" category[121]. Contrary to the existing credit practices today, the Basel II blocks the substitution of counterparty ratings with the rating of the guarantor. Under the new Basel framework, the guarantee is taken into account at facility level and mostly better rating of the guarantor is used with respect to both economic and regulatory capital requirements.

5.2.1.2 Need for Bi-Dimensional Rating (pp. 396-399)

A qualifying IRB rating system should be bi-dimensional. It should *separately consider* the risk of borrower default (obligor rating) and transaction-specific factors e.g., collateral or other guarantees. Hence the rating system should not be based on the overall expected loss of the exposure. For banks using the A-IRB approach, facility rating must reflect exclusively the Loss Given Default measure (LGD). *LGD is defined as the "economic loss that the bank expects to suffer on a credit facility of which the counterparty defaults"*. The LGD is expressed as a percentage of the expected exposure at default. In this regard, each credit proposal should contain the obligor rating and facility (LGD) rating.

In light of the changing capital adequacy legislation, a bank may opt for the A-IRB Approach, when approved by the regulator. This approach will allow the bank to use its own estimates of LGD, EAD PD and maturity as building blocks for calculating minimum capital levels for credit risk exposure. *In essence, assigning an LGD means comparing the net values of the bank's collateral (or seniority when unsecured) to the expected outstanding at the time of default (EAD).* The LGD rating corresponds with a percentage, assigned at origination or at review when it is referred to as the "expected LGD".

5.2.1.3 Rating Structure and Granularity of Rating Grades (pp. 403–408)

Both borrower- and facility-rating scales should avoid excessive concentration within the same grade. For corporate, sovereign, and bank exposures, a borrower-rating scale must have at least seven different grades for non-defaulted borrowers plus one for defaulted borrowers. The grade definition must include both a description of the degree of default risk typical for borrowers assigned the grade and the criteria used to distinguish that level of credit risk. Concentration risk is the mortal enemy of good credit risk management, where banks preferably use limit systems to tightly control for

121 The same rule applies for the cash collateralized facilities under limited financial information.

such correlation effects. It is far better and more practical to have that maximum exposure set by risk rating so that exposure and risk are more closely matched.

5.2.1.4 Rating Criteria and Processes Documentation (pp. 410,418- 421)

A bank must have specific rating definitions, processes, and criteria for rating assignment. Criteria must be documented and clear enough to allow third parties (e.g., auditors, supervisors) to replicate rating assignments. Rating procedures and responsibilities in rating assignment must be documented as well. The process descriptions are provided in sub-section 5.6.1.1 "Credit Approval Process Framework".

5.2.1.5 Rating Assignment Horizon (pp. 414 – 416)

The Basel committee recognizes that "although the time horizon used in PD estimation is currently one year, banks are widely expected to use a longer time horizon in assigning ratings. *A borrower's rating must express the borrower's essential ability and willingness to perform, despite adverse economic conditions".*

As mentioned earlier, obligor ratings reflect the probability that obligor will default, but the critical question is: What is the relevant time horizon? Do counterparty ratings predict default risk over one year, over a complete business cycle or something in between? The answer to such questions lies in the extent ratings should be assigned and validated. The thesis will evaluate the choice of rating horizons in Chapter 6, sub-section 6.6.1, but here are the two extremes in brief:

1. **Point in Time (PIT):** PIT ratings represent the default probability in a relative short period, typically one year. PIT ratings tend to adjust quickly to changes in the financial conciliation of a counterparty and/or economic environment; hence these ratings are relatively volatile. Overall, PIT ratings tend to fall during economic downturns and rise during economic expansions.
2. **Through the Cycle (TTC):** TTC ratings represent the probability of default taking into account a full business cycle. TTC ratings change only if there is a fundamental change in the counterparty's situation, business and outlook. TTC ratings will not change due to business cycle patterns. Consequently, TTC ratings change less in frequency and magnitude than PIT ratings[122].

Important considerations for the choice of the rating horizon under IRB approaches emanate as follows:

- It is naturally desirable that internal ratings based credit risk measurements are intuitively consistent with how credit risk is assessed within the bank. For example, when judging the credit risk of lending to counterparty, a bank does not limit itself strictly to one year, but considers explicitly potential downside risk. Higher and more immediate the downside risk is, more credit analysis focuses on the immediate future and consequently shorter the rating horizon will be. This is consistent with the approaches external rating agencies take.

122 For PIT vs. TTC debate, Ranson, B.: Credit Risk Management. Texas: Sheshuneoff, 2005, chapter 5, pp. 14-40.

- Basel II requires that ratings or the default rates are "stressed", which means that an economic or industry downturn is considered in the rating assignment[123].
- For reasons of transparency and the purpose of benchmarking to market standards, an IRB-compliant bank has to map its internal ratings to the ratings of renowned agencies like Standard & Poors (S&P), Moody's and Fitch. According to S&P, its credit ratings are meant to be "forward looking" and their time horizon extends as far as analytically foreseeable. Ratings are held constant through the cycle, or alternatively, they may vary, but within a relatively narrow band. Similar to S&P, Moody's holds a similar procedure when assigning agency ratings, however, its subsidiary, "KMV", which is a credit and portfolio risk management solutions provider, offers further depth on the selection of models and rating horizons in Chapter 6, sub-chapter 6.6.1, "Time Horizon".

Consequently, an IRB-compliant bank should apply the following rating philosophy to assess default risk[124]:

- The credit authority assigning counterparty rating must take into account longer-term downside risk. The rating horizon of the rating grades should be between two and five years, where lower the default risk is, longer the rating horizon becomes. If default risk is high then the internal rating primarily should reflect this high (immediate) risk. However, if there is a low probability of short-term default the rating should reflect the medium term risk considering positions when business conditions might have become less favorable.
- Although in many aspects the internal ratings and agency ratings are comparable, this does not preclude, that internal grades and external agency ratings might be different on some aspects or for some counterparties.

5.2.1.6 Use of Models (p. 417)

This paragraph puts greater strength on the *predictive power of the model* and its combination with the human judgment to avoid possible idiosyncratic errors made by the *formal rating systems***.** The bank must demonstrate that the data used to build the model is representative of the population of the bank's actual borrowers and facilities.

5.2.1.7 Use of Internal Ratings "Use Test" (pp. 444-445)

Internal ratings and default loss estimates must play an essential role in the *credit approval, risk management, internal capital allocation and corporate governance functions of banks* using the IRB approaches. It is recognized that the same estimates may not be used for all purposes (e.g., PD and LGD estimates for pricing purposes may differ). According to paragraph 444 of the new Basel framework, "*Rating systems and estimates designed and implemented exclusively for the purpose of qualifying for the IRB approach and used only to provide IRB inputs are not acceptable. For example, pricing models are likely to use PDs and LGDs relevant to the life of the asset. A Bank*

123 BIS, Framework (2006, parag. 434-435).

124 Blochwitz, Martin and When (2006) have coined the term "Rating philosophy" as being, what is commonly referred to as either PIT or TTC ratings. Blochwitz, S. /Martin, M. /Wehni, C.: Statistical Approaches to PD Validation. In: Engelmann, B. /Rauhmeier, R. (eds.): The Basel II Risk Parameters –Estimation, Validation and Stress Testing. Berlin: Springer, 2006, pp. 289-306.

must have a credible track record in the use of internal ratings information for at least three years prior to qualification".

When a uniform counterparty rating is proposed or reviewed, then in most cases a counterparty rating model will be applicable, e.g. a "corporate rating model" or "bank scoring model" etc. If a rating model is applicable, the relevant rating information for the credit proposal must be inserted into the respective model. The output of the rating model must be attached to the credit proposals for decision making purposes by the credit authorities. This "inclusion of the rating information" into the credit proposals should reflect the "sound and integral implementation" of the rating systems, before the approval of the regulatory authority. An IRB-compliant bank using the A-IRB approach must demonstrate that it has been estimating and employing LGD and EAD for at least 7 years (parag. 472), whereas estimating and employing PDs require historical data for at least for 5 years (parag. 463)[125].

5.2.1.8 Risk Quantification and Data Standards (446-451, 461-467)

Generally, all banks using IRB approaches must estimate a PD to each internal borrower grade for corporate, sovereign and bank exposures and to each pool for retail exposures. Data collected beyond the implementation date must comply with the minimum standards, unless otherwise stated. Furthermore, banks on the A-IRB approach must estimate an appropriate LGD and EAD for each of its facilities, which must be backed up by historical experience and empirical evidence. The internal rating models for PD, LGD and EAD must perform powerful and highly accurate in-, and out-of-sample.

5.2.1.9 Corporate Governance and Oversight (pp. 438-440, 441-443)

All material aspects of rating assignment and estimation processes must be approved by the supervisory board and the senior management. Management must ensure regularly that the rating system is working properly. Banks must have independent credit risk control units that are responsible for the design and implementation of internal rating systems, model tests, and reviews. The Internal Audit or an equally independent function must review the whole rating system at least annually.

5.2.1.10 Double Default Framework and Rating Migrations (pp 435i-436, 469)

Double Default refers to the default of both the obligor and the guarantor at the same time[126].Banks using the double default framework must consider as part of their stress-testing framework the impact of deterioration in the credit quality of protection providers, in particular the impact of protection providers falling outside the eligibility criteria due to rating changes. Banks should be aware of the *impact of the default of one but not both of the obligor and guarantor on the risk* and capital requirements at the time of default. Furthermore, banks should consider the rating migrations, due to the changes in credit quality, external ratings or the worsening of the credit cycle. In its

125 Gaumert, U.: Core Principles of Ratings – Basel II and MaK confirm Organization of the Credits. Köln: Bank-Verlag, 2005, p. 21, (in German).

126 Peter, C.: Estimating Loss Given Default – Experiences from Banking Practices. In: Engelmann, B. / Rauhmeier, R. (eds.): The Basel II Risk Parameters. Berlin: Springer, 2006, pp. 144-175.

analysis, the bank must consider the extent of any dependence between the risk of the borrower and that of the collateral or collateral provider. In first versions of the document, Basel II restricted risk mitigation effects of guarantees. Currently, banks are using "substitution approach". Under this approach, facilities that are partly guaranteed are split into two parts for the calculation, namely a guaranteed part and an un-guaranteed part. For the guaranteed part, rating substitution is used when calculating the expected loss and capital required. If the rating is better than the rating of the obligor, the rating of the guarantor is used to calculate expected loss and the capital for the guaranteed part of the facility. If the rating of the guarantor is equal or worse than the rating of the borrower, the rating is not substituted. After calculating expected loss and capital separately for both parts, they are summed up to get the total figure for the facility. In the revised Basel II document, however, the bank can only lose money when both the obligor and the guarantor default at the same time under the double default methodology. In this case, the 1-year joint default frequency (JDF) should be used to determine expected loss and capital for the guaranteed part of the facility[127].

5.2.1.11 Validation (pp. 500-505)

Banks must have a robust system in place to validate the accuracy and consistency of rating systems, processes, and the estimation of all risk components. Conceptually, validation encompasses a range of processes and activities that contribute to an assessment of whether ratings adequately differentiate risk among borrowers and risk components (PD, LGD and EAD) appropriately characterize the relevant aspects of the risks. Even though the Basel II framework does not specify what exactly constitutes a proper validation, the validation of internal rating systems lies at the center of the IRB approval process. Therefore, the determination of content and meaning of validation is left to the Accord Implementation Group (AIG)'s further research and proposals[128]. Fulfilling the validation requirements of any supervisor is likely to include reference to the "independence" of the validation process. Accordingly, the equivalent CEBS guidelines suggest that the validation processes and results should be reviewed for integrity by parties independent of those responsible for the design and implementation of the validation process[129]. In this regard, the establishment of the independent validation unit called, GRM Quantitative Consultancy (GRM QC), is proposed as a starting point for the resolution of validation issues.

Since 2004 with the release of the Basel II accord, financial services industry has been facing major changes right across the business. Nevertheless, the problem is not exactly at the definition stage. The banking industry has to wait and see how the new rules will be interpreted if and when they are converted into the statements of discretionary "banking directives". There are difficult decisions to be made before understanding the size and nature of the challenge, and there is every potential for making very expensive errors on the forefront of Basel II. Given this complexity, it is likely that many banks will find themselves in a situation, where getting their senior management fully engaged into the implementation of IRB will be difficult for the following reasons:

127 Peter, C.: Estimating Loss Given Default (2006, p. 165). For technical details see BCBS and double default documents.

128 Basel Committee Newsletter No. 4, "Update on work of the Accord Implementation Group related validation under Basel II Framework, Jan. 2005, pp.1-4.

129 Cited in, Duncan, E.: Regulatory Priorities and Expectations in the Implementation of the IRB Approach. In: Ong, M. K. (ed.): The Basel Handbook, 2nd Edition – A guide for Financial Practioners. London: Riskbooks, 2007.

- Responsibility for change and the commitment to meeting the new standards are not always clear.
- There is a substantial increase in the number of rules and their complexity, which place a barrier for a complete interpretation.
- The implementation date for IRB approaches in Turkey, the end of 2009 has always seemed rather distant, while there are more urgent needs that call on the genuine resources.
- Data cleansing itself constitutes a big deal of challenge.
- Last but not least, a successful implementation requires a mentality change across all layers of the organization, which in itself is a major challenge.

The experience richly acquired through the Basel II implementation programs like that of Barclays Bank for instance shows that to be an undisputed winner, there are a few critical areas of focus. In the next sub-sections, the thesis will evaluate the activities that a successful organization needs to prioritize and increase focus on[130].

5.2.2 Capital Management and Origination

According to the Barclay's Bank's Basel II experience, there are two main stages to capital management at pre- and post-origination of risk assets. Pre-origination management of capital requires a thorough understanding of the impact of regulatory rules on target portfolios, and the multiple products associated with each segment. In order to be effective, each business line and product area must have a deep understanding of the regulatory capital effects of the new regulation, and the boundaries that they must work within. The business side can not be expected to do this alone because Basel II covers a broad range of issues with a formidable level of complexity. "A successful Basel II project team will ensure that each area of the business is in an emphatic position to react to the pre-origination issues". This means that the whole change in the risk management and client management areas of a bank should be supported by a complementary change in the primary management philosophy of the Basel II implementing bank. The management should be indoctrinated towards the "creation of value". At which facility the value is destroyed should be of great concern for the portfolio managers and this fact should be immediately reported to the management[131].

On the product side, the product teams will have to understand the capital implications of the facilities under the new rules. Accordingly, to preserve capital and to ensure the ongoing profitability, they should be allowed to act in order to change the risks associated with the customers and products. In the post-origination stage, there should be a possibility for the business side to reduce capital through risk mitigation, diversification or re-pricing of the facilities, if it elects to do so. The business needs to develop a culture, organizational structures and necessary mechanisms to off-load assets at a reasonable cost to reduce risk weighted assets and hence capital requirement,

130 Wilson, I.: Implementing Basel II: A case study based on the Barclays Basel II preparations (2004, pp.1-10).

131 For Risk Management and Shareholder's Value in Banking refer to Resti / Sironi, 2007, pp. 651-735 and Rao, V. / Dev, A.: Capital Allocation Using Risk Management Tools, Economic Capital and Shareholders' Value Creation. In: Ong, .M.K (ed.), Risk Management – A Modern Perspective. London: Elsevier Inc., 2006, pp.415-433.

when the market conditions do permit for this. The power and ability to change the balance sheet to release regulatory capital depends upon the views of the external stakeholders, such as:

- Regulatory bodies
- Equity Investors
- Debt Investors
- Rating agencies

5.2.3 Risk Management

The key purpose of Basel II is to align regulatory capital assessment more closely with the risks faced by the business. Banks have been managing credit risk for many years with differing on levels of sophistication. No matter what the current level of risk management capability, there are still areas that need to change for the better, in order to comply with the specific requirements of the IRB approaches. On the other hand, it is important to maintain the existing standards, which may be more rigorous or further advanced than Basel II, while ensuring that regulatory standards are met. There are a few areas that a bank should actively concentrate on in the early stages of the Basel II implementation for the successful compliance with the regulation. These can be summarized as the models, minimum standards, policy, governance and reporting issues.

Even if the bank is successful in obtaining IRB status, there are significant maintenance costs that must be absorbed. Models have to be validated annually or more frequently if they fall outside pre-determined performance ranges. The whole risk infrastructure has to be able to keep up with any upgrading standards that the regulator can impose at its discretion. *To implement the IRB, the bank needs to be extremely honest with it*. If the bank has the budget and the will to move to IRB approaches, it must be able to satisfy the following:

- Sufficient number of people of high caliber to enable and sustain the IRB framework
- Process and systems change capability that can be sustained alongside all the other change that is planned by the business.

If the bank can satisfy the above conditions then it is time to consider the advantages and disadvantages of shifting to one of the IRB approaches. Initially, the modification required to achieve IRB status is significant and comes with high costs attached. Secondly, the amount of energy and efforts the organization will invest in managing the change is significant. Finally, there is the risk of failure and the associated repercussions. Having deployed a considerable number of resources in building and maintaining a “candidate” system for IRB, the failure of the candidate system during the supervisory review and evaluation would mean a bank would have to revert to using the Standardized approach or something close to it, as agreed with the regulator. This would result in the loss of any capital advantage that was expected from the IRB approaches, and cause repercussions in the marketplace, such as share price devaluation and reputation risk that might lead to possible rating downgrades.

5.2.4 Program Management

It is possible for the scope and complexity of change to be so pervasive at the bank that the change can not be achieved by a central project team alone. To achieve any success in IRB implementation, the common reservations must be 'socialized' across all the business areas of the bank. Accordingly, the buy-in of each business area must be obtained for the reasons of change, so that each business area will be ready to meet the challenge.

The leadership of a program on this scale must be highly dedicated to the task, as the task at hand can not be carried out by the desk. Successful implementation relies upon a strong and visible leader with a clear sense of direction and an ability to understand the big picture that stretches from systems, governance, data, and process to individual business requirements side-by-side with the risk management requirements.

A successful program will need to call on a significant number of highly specialized resources from each business area, but also of the ability to understand, at least on a high level the issues concerning business areas other than their own. While IRB compliance may be a medium-term goal for most banks in Turkey, the changes must start now. *During a change program, it will be suicidal for banks to wait for the regulators to provide clarifications and interpretations on the standards and consultative papers of Basel II. Instead, the bank should create a team of experts, with specializations ranging from regulatory capital to modeling, data management, risk process and governance. Successful implementation will depend upon the available expertise at the bank!*

5.3 Organizational Backbone of Basel II Compliant Risk Management Framework[132]

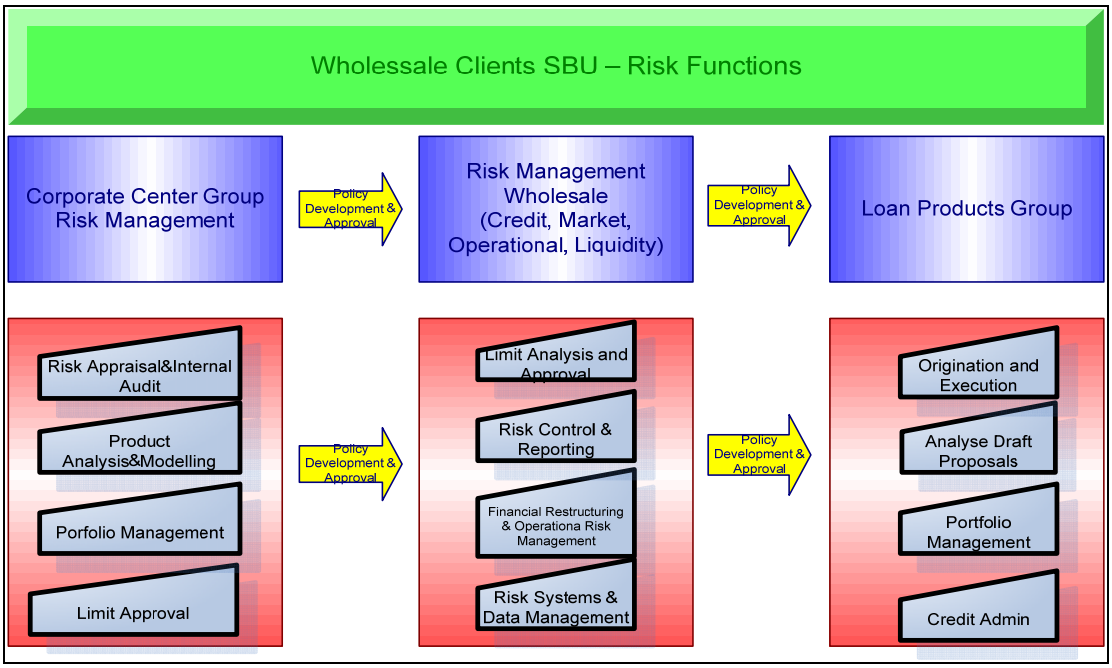
On the path to Basel II, to sustain a long term cultural shift in risk and capital management, the starting point for a bank will be the design of an organization with a strategic emphasis on the "Wholesale Banking" supported by a separate "Wholesale Clients Risk Management" (WCRM) within a multi discipline banking context (that usually includes retail banking, asset management, commercial banking etc.). Under this context the role of the risk management may be defined as follows:

"Risk Management covers all risks including credit, market, operational liquidity and documentation related to credit facilities to be provided to Wholesale Clients (WCS) and involves the process from origination to approval and ongoing control, review, maintenance and optimization of exposures".

132 Sources consulted to complete this section: Edwards, P. /Bowen, P.: Risk Management in Project Organizations. Oxford: Butterworth-Heinemann, 2005, Chapter 9: Building a Risk Management System; Lore, M. /Borodovsky, L. (Eds.): The Professional's Handbook of Financial Risk Management. Oxford: Butterworth-Heinemann, 2000, Part 4: Capital Management, Technology and Regulation. Especially, refer to the article of Shyam V. for Implementing a firm-wide risk management framework. For the organizational transformation process as a case from Switzerland, Wuffli, and P.A.: Elements and Processes of the risk/return Optimization in a Bank Conglomerate – Case SBV. In: Basler Bankenvereinigung (Ed.), Risk Management in Banken. Bern: Paul Haupt Verlag, 1994. For the integration of risk management into the strategic management process, Hirszowics, Ch.: Swiss Banking Policy, 5th. Edition. Bern: Paul Haupt Verlag, 2003 (in German) and Jovic, D.: Risk Oriented Economic Capital Allocation and Performance Measurement in Banking. Berne: Paul Haupt Verlag, 1999 (in German). For Basel II compliant Credit Risk Management, Ranson, B.: Credit Risk Management. Texas: Sheshunoff, 2005, Chapter 17 organizational and human resource issues of credit risk management. For sources from Germany to compare min. credit standards (MaK) in an organizational context: Henrich, M.: The MaK from the Perspective of a Bank. In: Hofmann, G. (Ed.): Basel II and MaK. Frankfurt: Bankakad. Verlag, 2002 (in German). Last but not least, a superb implementation of IRB is provided at Gaumert, U.: Core Principles of Rating. Köln: BankVerlag, 2005 (in German).

The following chart provides a blueprint for a Risk Management organization where the structures can be extended and customized as appropriate to each country of operation, bringing into consideration its specific banking system.

Figure 5.1: Wholesale Clients – Risk Management Organization and Core Functions



Source: Author

By appending the Basel II based risk-, product- and facility types under the wholesale clients risk management functions as main ingredients of the organization, the author intends to re-emphasize the importance of the risk management function and the improved practices under the new Basel framework. While prudential capital adequacy rules are applied by each Turkish bank in an evolutionary nature, it seems clear from the existing organizational and functional developments to date that, IRB implementation as a major piece of Basel II will be securely and peacefully anchored in its "regulatory place". However, it is also apparent that the IRB implementation still awaits further developments in the Turkish banking system when compared to the structure and functions illustrated in Figure 5.1. The wider scope of IRB implementation relies not only on modeling capability, quantitative and qualitative capital adequacy rules, but also on organizational structures and responsibilities combined with effective credit approval processes. The difficulty faced by bankers in Turkey has been compounded further by delays in finalizing the regulatory documents with regards to the Basel II framework, in particular the IRB approaches. Although the banks in Turkey are now more focused on the modeling, data, systems aspects of the new Basel framework, the Pillar 2 ICAAP and SREP of the new accord interestingly stress the equal (if not more) importance of corporate governance, the best practice uses and the risk culture at banks. If banks fail to satisfy the regulators on how as an organization and its functions they manage and mitigate risks, the regulators can increase the capital requirements of the bank. Please refer to details in Chapter 3, sub-section 3.4.3.3 Pillar 2, "Role of Supervision". Consequently, the organization structures and functions are the key for a successful implementation of Basel II IRB approaches.

For convenience and expediency, Figure 5.1 lays out the foundations of an exemplary IRB organization for a given business group, which is in this case the wholesale corporate banking group. In essence, Figure 5.1 suggests the basic organization of risk functions under the new Basel II framework. Intended as a blueprint for the new structure of risk management, the chart does not provide detailed information on the operational procedures and policies, all of which are subject to change with the new Basel II requirements and will be unique for each business domain of the bank. Therefore, more business-specific rules and guidelines should be established throughout the Pillar 2 process of a bank and disclosed in Pillar 3. Moreover, it should be recognized that the successful transition from the current situation to the structures as a result of the Basel II framework requires an actively managed change process. The transition management and business-specific issues are outside the scope of this thesis and sub-section.

In addition to the organizational changes related to the management of all risks, the re-design specifically involves relatively large-scale changes to the management of credit risks. The new credit risk structure represents a migration from a decentralized system to the one with primarily centralized approval and decentralized monitoring and control. This change is intended to create a more efficient, reliable and sophisticated credit function. Similarly, the measurement, monitoring and control functions remain a vital component of the "semi-independent" risk organization. The re-designed risk organization remains consistent with the BIS principles for best practices of Credit Risk Management (September 2000). All of these developments led to the concepts of "Group Risk Management" or to "Enterprise Risk Management" functions, that overseas the integrated risks for the entire institution.

5.4 Group Risk Management (GRM) as the Final Decision Maker

5.4.1 Organization of GRM and its Functions

The mission of the Corporate Center Group Risk Management or Group Risk Management in short is to improve economic value for shareholders through maintaining a high quality risk portfolio and therefore ensuring the "targeted" rating of the bank. The GRM is responsible for formulating and setting the overall policy framework for credit-, market-, industry-, product- and operational risk for the bank. This should be done in close cooperation with the Strategic Business Units on the risk management side, such as the Wholesale Clients Business Units depicted in Figure 5.1 in previous section. *The GRM presides over all risk management activities of the bank and is primarily focused on the following activities:*

1. The development and approval of the high level risk policy.
2. Management of risks on a high level by individual and portfolio basis.
3. Institutionalization of prudent control mechanisms.
4. Approval of large exposures.
5. Management of intra strategic business unit issues.

The daily management of all risk functions is handled by Wholesale Clients Risk Management Units. The organization of the Group Risk Management, involves the several functions, which will be discussed in the next sub-sections.

5.4.2 Group Credit Risk Management

The credit risk management can be structured on the basis of the Advanced IRB approach, sustaining the future organizational and procedural requirements of Basel II. Even if Standardized approach or Foundation IRB is chosen or approved initially, the rating framework should be developed such that they can accommodate Advanced IRB in the future by allowing for the classification of facilities to different LGD scales. The preparation, write-up and the structuring of the incoming proposals can be executed by the Loan Products Group, which will be discussed in a separate sub-section in detail.

For wholesale client proposals, the approval organization can be aligned along the main industry sectors that the bank should strategically choose. This is to ensure maximum efficiency and well informed decision making based on industrial sophistication. Proposals for final approval by a Head Office Credit Risk Committee should be analyzed and advised upon by the respective industry desk of the risk management function at the Strategic Risk Business Units (e.g. Telecom, Technology, Diversified Industries or Energy). Analysts at Risk Management Wholesale industrial desks complete a comprehensive risk review of each proposal and provide a written analysis and recommendation for submission to the relevant approval authority. Each Strategic Business Unit should be granted a delegated approval authority by the Managing Board, which should be in principle risk-weighted by the amount of the loan to be booked and also be based on the internal rating of the obligor. In terms of risk appraisal, the requests of the credit risk management at the Group Risk Management level will normally request the following items:

- Does the risk profile of the portfolio match the specific parameters approved by the bank?
- Does the bank use the counterparty policies with respect to all existing and new products?
- Are these policies properly implemented and are adequate monitoring systems in place?
- Rating verification, are the correct ratings assigned to the facilities and to clients?
- Is the quality of the risk management process in harmony with the standards?

As seen from the content of the above questions, the unit will operate independently or jointly with the business units under formal mandates. Higher transactional and policy approval authorities may be exercised via several committees. This will consist of several Group Risk Committees, which may be established upon needs of policy, provisioning, operational risk and other strategic issues. To give an example, Group Risk Committee (GRC) may decide proposals above the SBU delegated authorities. The Policy- Group Risk Committee (P-GRC) on the other hand may be mandated for the decisions on major credit policy, product programs, rating models, economic capital allocation issues. *The decisions of the GRC should be final and since the delegation is in full, the Managing Board or its individual members should not entertain appeals to GRC's decisions. This is important from the "principle of independence" perspective.*

5.4.3 Overall Risk Policy and Group Portfolio Management (GPM)

As indicated before, the Group Risk Management is responsible for formulating and setting the overall policy framework for credit-, market-, industry-, product- and operational risk for the bank. In addition, the portfolio management unit is jointly established to ensure the ongoing development and the use of portfolio management techniques for optimizing the use of economic capital[133]. Specific responsibilities should include:

1. Drafting high level portfolio policy and guidelines for the SBUs.

2. Coordinating the development and implementation of Portfolio Management (PM) tasks in the SBUs.

3. Consolidating the PM data obtained from the SBUs

4. *Monitor the integrity and consistency of data, including ratings, migration, exposures and losses caused by defaults.*

5. Support expansion of rating models to capture all exposures.

6. Establish models for the analysis of the portfolio.

7. Coordinating the development and implementation of Risk/Reward models (RAROC) for use by commercial units at the client level.

The active portfolio management, activity data ownership, processes and portfolio optimization should be handled by the respective SBUs. In order to manage the balance sheet, the liquidity and the interest rate risks, an ALCO structure should be established mirroring the organizational structure. Risks other than credit risks fall outside the scope of the thesis, and hence are not discussed further here.

5.4.4 Product Analysis and Modeling

The Product Analysis and Modeling department consists of three groups; 1) Credit risk, 2) Market risk and 3) Operational risk modeling groups. The Credit Risk Modeling Group is responsible for the analysis and validation of valuation models as well as the development and improvement of quantitative models for the measurement of credit risks within the bank. The activities of the credit risk modeling group should include:

1. Development and implementation of methods for the measurement of present and future counterparty risk of credit and derivative transactions.

2. Development and implementation of credit risk portfolio models. These models measure the credit risk in portfolios of loans and trading book

133 For detailed concept ional issues of capital allocation and performance measurement, Ong, M.: Internal Credit Risk Models, Capital Allocation and Performance Measurement, 1999, pp. 93-163.

exposures in client groups. These models can be used to determine the adequate amount of economic capital the bank should hold as buffer against credit risk, but also to evaluate the profitability of individual transactions or groups of transactions on the basis of RAROC.

3. Validation of models and systems being used for valuation and risk management of the bank's commercial and trading activities as proposed by SBUs.
4. Models, typically proposed by the front office, are independently evaluated and contrasted with alternative models. Approval of the model by the market risk modeling group is a prerequisite for trading authorization.
5. Development of IRB models for mortgages and retail credits.

Again, risks other than credit risks will not be analyzed in this thesis as it falls outside the objectives.

5.4.5 Internal Ratings Ownership and Approval Authorities

Each rating is owned by a GRM department responsible for the underlying theory, models, construction procedures, supporting data and validation. While changes to the rating methodologies are to be notified to the Group Risk Committee, approval on methodology changes is always at Policy-GRC level. Furthermore, specific processes, responsibilities and authorities apply to the development, implementation, review and validation of the Internal Rating System and Models. Processes should be separately defined for:

1. Corporate Lending: All lending to commercial, financial institutions and private clients which do not qualify as retail under the new Basel framework.
2. Retail Lending: All lending to consumer clients and small businesses which qualify as retail credit under the new Basel framework.

In a sense, Policy-GRC is the responsible committee for the approval of the overall structure and policies for the internal rating system and material changes. Key characteristics of the internal rating system to be approved can be outlined as follows:

- Overall architecture and design of rating models (PD, LGD and EAD).
- LGD definitions in relation to the LGD-scales used within the IRB bank.
- Rating grade definitions and validation of the master PD scales associated with the rating grades.
- Responsibilities and policies in the rating assignment process and review.
- Responsibilities in validation.
- Control and oversight structure.

5.4.5.1 Corporate Internal Rating System

According to *FSA* in relation to the *IRB approach*, "*An Internal Rating System* comprises all of the methods, processes, controls, data collection and IT systems that support the assessment of credit risk, the assignment of *exposures* to grades or pools (rating), and the quantification of *default* and *loss* estimates for a certain type of *exposure*"[134]. All material aspects of the definition of an Internal Rating System and the following estimation processes must be approved by a competent committee, and it must be ensured on an ongoing basis that the rating system is operating properly. The rating system and models, after development and initial approval, have to be reviewed and validated annually.

5.4.5.2 Development, Implementation and Review

The GRM's Credit Ratings & Portfolio Management (CR & PM) is the central unit that should be responsible for the development of group-wide rating policies jointly with the strategic business units and the proper documentation of the rating models and policies. Furthermore, *CR & PM will be responsible for the coordination, initiation and support of rating model design and reviews and the preparation of rating validation activities*. The model development and implementation processes must be thoroughly described. This includes the data selection process as well as the documentation of methodologies, assumptions and mathematical or empirical evidence. All data used to gradually develop models will have to be retained. In that respect, the requirements surrounding the use of internal ratings are exhaustively defined by Basel II and the development, testing and instructions for use of rating methodologies should be documented in such a manner that external parties (such as supervisory bodies, rating agencies) can review and evaluate them.

Accordingly, *FSA* requires from the users of IRB approaches that "A *firm's* documentation relating to data should include clear identification of primary responsibility for data quality. A *firm* should set standards for data quality and aim to improve them over time. A *firm* should measure its performance against those standards. A *firm* should ensure that its data is of high enough quality to support its risk management processes and the calculation of its capital requirements"[135].

The impact of such directive will be clearly challenging for the risk management functions. The capital calculations for credit risks will become dependent on the quality of data. Moreover, the Basel II accord requires the capture and storage of numerous data elements, which are not necessarily captured accurately (or at all) within banks in Turkey to date, such as the exposure at default and loss given default estimates. Management should establish accountability and ownership of data quality within CR&PM and prepare for the "audits" of data quality, by the date of supervisory review and evaluation process for banks adopting IRB approaches in Turkey.

134 FSA, Handbook, definition of a Rating System, BIPRU 4.3.25 and BIS Framework, parag. 394.

135 FSA, Handbook, Documentation of Rating Systems, BIPRU 4.3.23.

5.4.5.3 Validation

Validation is defined by *FSA* as "A *firm* must have robust systems in place to validate the accuracy and consistency of *rating systems*, processes, and the estimation of all relevant risk parameters (*PD*, *LGD*, *conversion factors* and *EL*). A *firm* must be able to demonstrate to the *FSA* that the internal validation process enables it to assess the performance of internal rating and risk estimation systems consistently and meaningfully"[136]. The most critical activity of the IRB process, the validation is set out by the FSA at its broadest level. For example, the "*accuracy of calibration*"(i.e. whether outcomes are consistent with estimate) and discriminatory power (i.e. the ability to rank-order risk) of its *rating systems* are high level standards bank must have processes that establish whether its *rating systems* meet those standards[137]. To meet those standards for validation, the following processes can be suggested:

- Data Collection and Cleansing
- Model Development
- Pre-Implementation Validation.
- Model Implementation.
- Model Testing refers to the evaluation of models and their implementation for internal validation and monitoring purposes. An independent consultant for validation is not required.
- Model Implementation Testing.
- Model Validation refers to the process of independently validating statistical models. The model validation process requires an independent consultant for validation. GRM Quantitative Consultancy (GRM QC) may be established for this purpose, which should be responsible for the organization of the validation process, including the selection of models for validation based on materiality and timing.

Also, the GRM QC has the following duties under the new framework:

1. It sets the minimum requirements for the validation.
2. It checks whether all calculations in the review have been performed properly and requests additional analysis when the results of the required analyses make it necessary.
3. It formulates the conclusions in the validation report resulting from the analysis and test.

136 FSA, Handbook, Validation of Internal Estimates, BIPRU 4.3.29 – BIPRU 4.3.38.

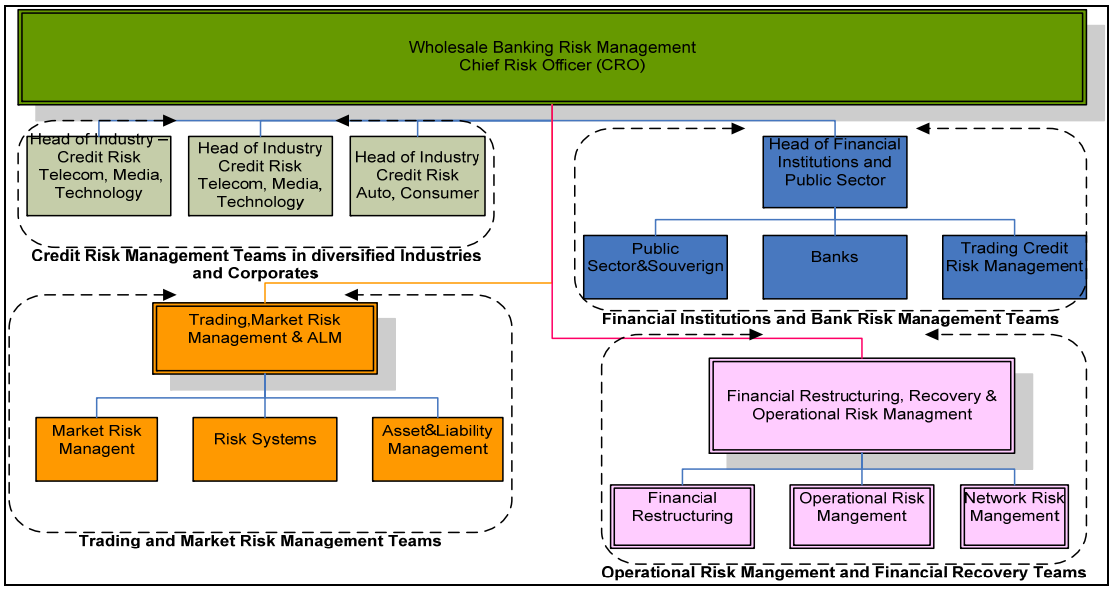
137 Basel Framework, Validation of Internal Estimates, parag. 500-505.

5.5 Risk Management Wholesale (RMW)

5.5.1 Organization of RMW and its Functions

The mission of Risk Management Wholesale will be to support Wholesale Clients Business Group's commercial strategies by independently managing all risk professionals within Wholesale Client Risk Management and coordinating with the Group Risk Management to support enterprise-wide risk management. The Risk Management Wholesale structure represents a migration to a largely centralized approval authority with decentralized monitoring and control within distinctive industry desks. The RMW aims for the integration of Credit, Market, Liquidity and Operational risk management, commencing with Basel II core principles. An exemplary RMW organization structure can be illustrated as in Figure 5.2.

Figure 5.2: Organizational Framework of Wholesale Banking Risk Management



Source: Author

The main responsibilities can be listed as follows:

- Analyze and decide upon risk limits via risk officers in the branches and global risk committees.
- Develop, analyze and decide upon policy and procedure papers in accordance with approval authorities.
- Manage risk officers, approving local organizational structures, delegated authorities.
- Analyze, approve and actively manage clients in financial restructuring and recovery.
- Assist commercial and client units in structuring deals and reviewing portfolios to minimize exposure and maximize returns upon a request.
- Monitor creditworthiness of clients and counterparties together with business units.
- Develop and activate strategies to manage risk exposures down as appropriate.
- Provide input into new product launches.
- Monitor local regulatory and legal environment.
- Monitor, control and report on risk exposures.

- Proactively identifies and manages any new or existing risks or risk processes not identified above.

The Credit Risk Management team inside the RMW is a mirror image of the client facing wholesale account management teams. The positioning of risk professionals alongside the client and product business units is instrumental in the bank's essential ability to manage its risks, providing local oversight into the exposures and risk processes within branches. While the client groups are involved in originating credit, market and trading risk patterns in diversified industry groups, the back-up risk frontiers of the bank should be in a position to reveal the necessary skills and management capabilities of the risks inherited from the business lines of the client groups. In terms of Basel II terminology and according to the IRB approaches, all exposures that must be classified as corporate, sovereign and banks (except equity and retail here) with different underlying risk characteristics are consolidated under their industry specific different exposure classes as organized above[138]. The classification of exposures in this way is broadly consistent with the established best practice methods of global banks. While it is not the intention of the Basel committee to ask for the application of the appropriate treatment to each exposure for the purposes of deriving their minimum capital requirements, banks must demonstrate to supervisors that their organization and their methodology for assigning exposures to different asset classes is appropriate and consistent over time. In this context, Basel II framework defined five sub-classes of specialized lending (SL) either in economic form or in substance[139]. These five-subclasses are defined as follows:

- Project Finance: Plants, infrastructure, telecommunication, power plants etc.
- Object Finance or Asset Based Lending: Fleets, ship, aircraft financing.
- Commodities Finance: Exchange traded commodities, crude oil, and all self liquidating natures of commodities finance.
- Income Producing Real Estate (IPRE): Office Buildings, residential buildings, hotels, warehouse projects.
- High Volatility Commercial Real Estate: Land development projects including the construction financing, property financing with uncertain source of repayments, ADC projects in general (acquisition, development and construction).

Further classifications are made with respect to the existence of revolving credit facilities for retail business and to the receivable purchase facilities arranged for retail and corporates. In this area, the Basel II mandated product or facility type descriptions too "tight" in comparison to the existing product lines of an ordinary bank in a global environment.

5.5.2 Financial Restructuring and Recovery (FRR)

The Financial Restructuring & Recovery is responsible for the management of distressed assets. The restructuring team supports the overall mission of the bank by maximizing the value of the distressed assets in accordance with bank's risk parameterization. To achieve this ideal objective, it should take the following approach

138 Basel II Accord Paragraphs 211-219

139 Basel II Accord Paragraphs 220-228.

depending on customer types:

1. Restructuring credits: This should involve in sequence of importance to;
- Secure and recover the largest part of the exposure.
- Bring it back within acceptable risk levels within the acceptable time frame.
- To the extent possible, without jeopardizing the client relationship as long as this does not negatively impacts the position of the bank.

2. Recovery credits: This should attain the highest amount possible and be executed within the shortest time frame. .
3. Ensure adequacy of the provisions for individual credits.

Specific attention should be made to FFR's current estimate on recovery rates and the portfolio management's view on what alternative recovery strategies may exist in the markets either through selling, re-packaging or securitizations.

5.6 Loan Products Group (LPG)

5.6.1 Organization of LPG and its Functions

Though LPG is a commercial function and independent from risk management, its heavy credit related responsibilities require active co-operation between the two. The mission of LPG can be summarized into three broad areas as depicted below.

Figure 5.3: Credit Process Functions

Client Management & Strategy Group	• Client Executive is responsible for the client strategy • Credit Structuring (CS) is responsible for managing the overall credit product portfolio for the client • Client Executive will involve the appropriate product BUs the client strategy discussions and in the final draft of the client plan • CE is responsible for Relationship Returns, Solvency utilization and Client Wallet issues
Loan Products and Credit Structuring	• A thorough due diligence will be conducted by CS and the relevant Product Specialists on client and proposed transaction to determine client's repayment capacity • For the proposed transaction will do the appropriate financial analysis. This will be done using the standard bank formats and rating tools (Risk Analyst) • Depending on the product, CS will prepare Credit Proposal Package. PM should be consulted as early as possible in the structuring phase in order that they may provide input regarding potential portfolio issues including concentration risks, RWA availability and indicative mark to market and mark to model information. • CS will sign off on all Counterparty Risks within the WCS, to be reflected in all Credit Proposals before these are sent for approval. • All credit proposal packages need to meet high quality standards, and comply with all Risk Management standards for processing. • The appropriate approving authority takes credit Decision. (Group Risk Committee or Wholesale Credit Committee or Industrial Credit Committee, or the regional Credit Risk Officer may comment on local credit issues if appropriate)
Portfolio Management	• Responsible for managing the loan portfolio in WCS based on risk adjusted returns criteria • Disposal of Assets as part of the Bank's Strategy • Maintaining and providing portfolio data and reports • Develop portfolio analytical models and tools • Develop asset pricing tools and models

Source: Author

In brief, the main activities of LPG are as follows:

1. Credit Structuring.
2. Assignment of obligor and facility ratings.
3. Portfolio Management.
4. Credit Administration.

The activities start with the origination, structuring, and execution of credit facilities, which include customer and transaction analysis, drafting of credit proposals, revisions, execution of credit transactions (including documentation) and continue with ongoing monitoring of client credit quality (including proposing changes to obligor ratings). It is important to note that LPG is involved in the joint origination of deals with the client account management groups generally at the very early stages of the deal structuring. The thesis will provide guidelines on the execution of all activities in next sub-sections.

5.6.1.1 Credit Approval Process

Before drilling into the activities of LPG, it is critical to propose an effective credit approval process that will support the easy transition to the new Basel framework. The following diagram specifies the "high level" framework, which is proposed in this sub-section for the credit approval process at a bank adopting the new accord. The different roles are performed by the Business, Product, Risk and Managerial Business Units. Accordingly, the new credit approval framework at a Basel II compliant bank can be based on the following processes:

- **Origination and Structuring:**

  Origination and Structuring process involves identifying credit needs of clients, gathering relevant specialist opinions and drafting of credit proposals. The rating proposal requires the interim basis for the origination of the credit risk by the client business unit and the structuring/re-structuring of the credit risk by the Loan Product Groups in a jointly manner.

- **Routing:**

  Routing means sending proposals possibly embedded with Credit Portfolio Management advice to the approval authority at the Risk Management functions.

- **Analysis and Decision:**

  This involves receiving and commenting on the rating and the contents of the proposal after a comprehensive review by the analysts. Often the analyst is responsible for communicating the decision of the credit approval authority to the proposing unit and recording the approved rating in the credit application system of the bank. Here, the official responsibility lies on the side of the "*Risk Management*". The authority to change the rating lies within the approval authority. Monitoring and functioning of the rating models and processes are the responsibilities of a Risk Management unit.

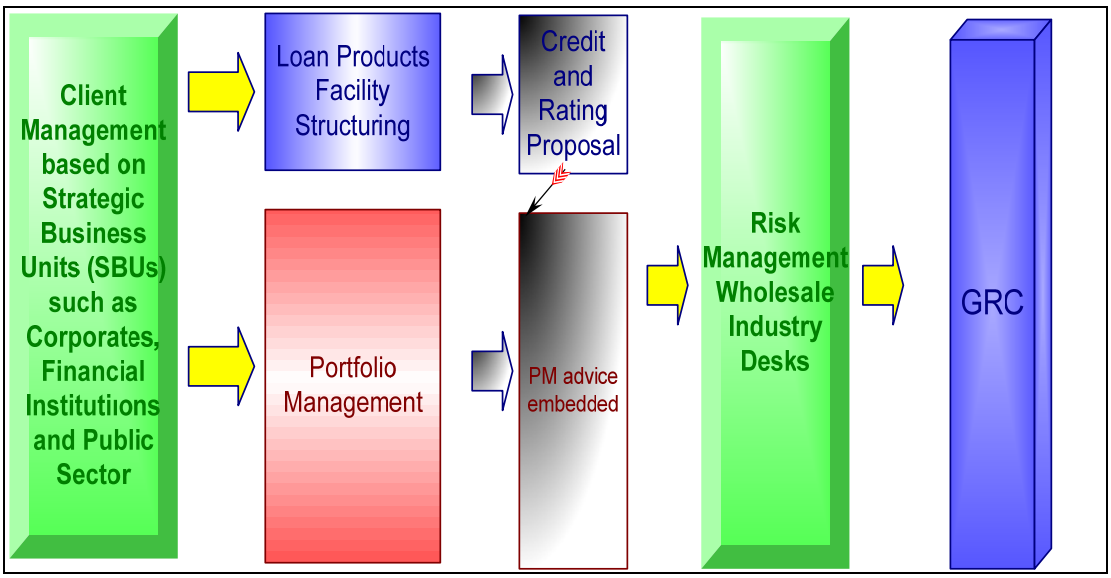
- **Execution and Booking:**

  Here, the responsibility lies on the Loan Product Groups.

- **Inspection:**

  Frequent inspection is performed by the Credit Risk Inspection and Loan Review teams.

Figure 5.4: Credit Approval Routing Process



Source: Author

5.6.1.2 Credit Structuring

The Loan Product Group takes the following steps in structuring a deal:

- A thorough *due diligence* is conducted by credit structuring experts and the relevant product specialists on client and proposed transaction.
- Credit Structuring is to determine client's repayment capacity for the proposed transaction and to do the appropriate financial analysis. This will be done using the standard bank formats and risk analysis tools as required. This includes proposing or reaffirming the clients' rating.
- Credit Structuring depending on the product prepare credit proposal package. The credit proposal package will include all required advice from client management groups.
- Loan Portfolio Management Group should be consulted as early as possible in the structuring phase in order that they may provide input regarding potential portfolio issues including *concentration risks, availability of risk weighted assets and indicative mark to market and mark to model information*. Where applicable, advice from the Portfolio Management Group is embedded in the proposal prior to submission.
- Credit Structuring would sign off on all counterparty risks within the Wholesale Credit Risk Management division. All credit proposal packages need to meet high quality standards, and comply with all higher level risk management standards for processing.
- Proposals received by "Risk Management Wholesale" are routed to the *appropriate industry desks for analysis and recommendation and then to the approval authority*. The appropriate approving authority takes the final credit decision. These may be the Group Risk Committee, Wholesale Credit Committee, Industry Credit Committee, or the regional credit risk officer and all these groups may comment on local credit issues if appropriate.

5.6.1.3 Obligor Rating Assignment by LPG

One of the main contributions by LPG is the actualization of the rating process. Each client and/or asset is to be assigned an Obligor Rating, a Recovery Category, and a Facility Rating.

Table 5.1: Converting Obligor Ratings and Recovery Categories to a Facility Rating

Obligor Rating	***Recovery Categories***							
	Cash	*Mrktble. Securities*	*Tightly Monitored*	*Liens - Full Coverage*	*Liens - Partial Coverage*	*Secured Vulnerable*	*Senior Unsecured*	*Subordinated*
	A	B	C	D	E	F	G	H
AAA	1	1	1	1	1	1	1	2
A+, A-	1	2	2	2	2	2	2	3+
BBB+	1	2	2	2	3+	3+	3+	3
BBB	1	2	2	3+	3	3	3	3-
BBB-	1	2	2	3	3-	3-	3-	4+
BB+	1	2	3+	3-	4+	4+	4+	4
BB	1	2	3	4+	4	4	4	4-
BB-	1	2	3-	4	4-	4-	4-	5+
B+	1	2	4+	4-	5+	5+	5+	5
B	1	2	4-	5+	5	5	5	5-
B-	1	2	5+	5	5-	5-	5-	6
Substandard.	1	2	5	5-	6	6	6	7
Doubtful	1	2	6	6	7	7	7	8
Loss	1	2	8	8	8	8	8	9

Source: Author

The matrix at the above exhibit is the representation of paragraphs 396-400 of the Basel II accord. According to the matrix, separate exposure types combined with different types of facilities in association of different security structures may result in multiple grades for the same borrower. In this respect, a two dimensional rating system would qualify even for F-IRB, when the supervisory estimates of LGD (1- Recovery Category) must be used for facility ratings. For banks using the A-IRB, facility ratings should quantify exclusively the amount of LGD. An Obligor rating captures the probability of a borrower or counterparty will default. The Recovery Category reflects the speculative level of a recovery where the bank is likely to experience in the event the borrower or counter party defaults. The Recovery Category is a function of whether a facility is secured or not and, if secured, the type and quality of the collateral. The Facility Rating summarizes the Obligor Rating information and the Recovery Category into a single rating number as shown in the table below. The red and blue areas may be called as "the non performing loan" valley, which should be divested along the financial restructuring process.

The interpretation of the matrix is as follows:

The green fields are reserved for all sizes of borrowers and security types consistently generating adequate levels of cash flow from internal and continuing operations to generally assure the timely repayment of all obligations. While debts of these entities are being paid as agreed and reasonable repayment sources appear to be viable, below average performance factors may have resulted in strained, although still positive, debt

service coverage. Negative trends are perhaps beginning to cause some minor concern. Requests for financial covenant relief may be increasing. Accordingly, semi-annual reviews are required. *The green field may be described as the "land of acceptable risks".*

The blue area on the other hand is reserved for the borrowers, whose debt service coverage from internal sources is very tight. External sources of liquidity are available but the company is not yet relying heavily on these external sources of liquidity. Sources of liquidity, while strained, remain adequate for now and identifiable solutions to the company's problems are achievable. Negative trends in the company's earnings or cash flow along with possible losses are accelerating. If these trends continue at their current levels or worsen, the credit will warrant inclusion into a criticized or classified category. Besides 5- or substandard means, "Special Mention Assets" that have potential weaknesses and deserves management's close attention. If left uncorrected, these potential weaknesses may result in deterioration of the repayment prospects for the asset or in the institution's credit position at some future date. As special mention credits, these assets may require quarterly reviews. Special mention assets are not adversely classified and do not expose an institution sufficient risk to warrant adverse classification. Debt service coverage is uncomfortably tight and the company is relying heavily on external sources of liquidity. Sufficient liquidity from external sources may be in question, however, and the ability of the company to resolve its operating problems is not immediately evident. *These assets are usually sold in the secondary market to relieve risk weighted assets and preserve capital.*

If the asset has been placed on non-accrual status, or assets are defined identically as type 6 or above risks with the additional point that either, there is no documented evidence to prove that future payments of principal or interest can be made or that monetary default is not imminent, the red zone may be defined as the "land of Non performing loans" valley. Those loans may be sold to special asset management companies at best, with an average pricing of 15% maximum of their face value.

Contrary to the paragraph 404 of the Basel II accord, which technically requires the banks to have minimum of seven borrower grades and just a single category of "default zone", the best practice methods suggest us to use several obligor rating categories combined with several modes of default grades. The implementation comfort of the "7 to 1" rule again is left to the discretion of the national supervisor. Basel II accord has also not specified any minimum amount of facility grades for banks using the A-IRB approach for estimating the LGD, which will be discussed in the next sub-section.

5.6.1.4 Determining the Facility Rating (LGD) and the Exposure at Default (EAD)

Loss Given Default (LGD) is the second building block of a credit risk measurement system and is defined as *the economic loss that the bank expects to suffer on a credit facility of which the counterparty defaults*. The LGD is the loss that will never be recovered in the economic sense. The LGD is expressed as a percentage of the expected Exposure at Default and depends on the collateral, defined by the definition of collateral (legal risk) within the national applicable law.

With collateral the bank may have a priority claim on the proceeds/sale of the collateral. The Net Collateral Value (NCV) is an indication of the expected recovery

value (1-LGD) of the collateral, in case of default. The NCV is calculated by multiplying the Collateral Value (CV) with the Recovery Rate (RR) of the collateral type as follows:

NCV = CV x RR, **(1)**
Recovery Rate (RR) = NCV / EAD **(1a)**

If the facility is covered by more than one collateral type, then the NCV is the sum of the all NCV_i
of $Collateral_i$. If the facility is covered with 100% cash, then it is assumed that the LGD is 0%.

Both at origination and review of the proposals, an LGD rating has to be assigned to each credit facility. Assigning an LGD rating means comparing the net value of a bank's collateral (or seniority when unsecured facility) to the expected outstanding at the time of default. Accordingly, the Exposure at Default, also known that "Outstanding at Default (OS)" is given by[140]:

EaD = OS + Usage given Default (UGD) x (Commitment – OS) **(2)**

When nearing default, an obligor will start using more of the credit facility. EAD is expected to be larger than the current outstanding of the facility and hence the unused portion of the facility is added to the amount outstanding. Under the A-IRB Approach, all collateral values must be evaluated considering the historical recovery rates. This means that, the bank's past workout performance ideally covers at least one complete economic cycle, and it is never shorter than seven years[141]. Accordingly, the recovery rates are mapped to different LGD classes. This distinctive LGD classes may be displayed as follows:

Table 5.2: Recovery Rates and LGD Rating Classes

Recovery of the Facility	Recovery Percentage	LGD Rating (Seniority) Class
Risk Free	100%	A
Excess Coverage	> 150%	B
Fully Covered	>90% < 150%	C
Partially Covered	>50% < 90%	D
Unsecured	0%	E
Subordinated	31% <	F

Source: Resti /Sironi (2007, p. 74)

The LGD classes and the risk indicators for different facility types are combined into the so-called LGD ratings and each LGD rating has a LGD-percentage assigned. The proposing unit has the primary responsibility for the assignment of LGD rating to each facility.

140 Araten, M.: Development and Validation of Key Estimates for Capital Models. In: Ong, M. (Ed.): The Basel Handbook, 2nd ed. London: Risk books, 2007, pp. 3-20.

141 Resti, A. /Sironi, A.: Loss Given Default and Recovery Risk – From Basel II Standards to Effective Risk Management Tools. In: Ong, M. (Ed.): The Basel Handbook, 2nd ed. London: Risk books, 2007, pp. 61-98.

5.6.2 Loan Portfolio Management Group (LPMG)

5.6.2.1 Organizational Background of the Portfolio Management Group

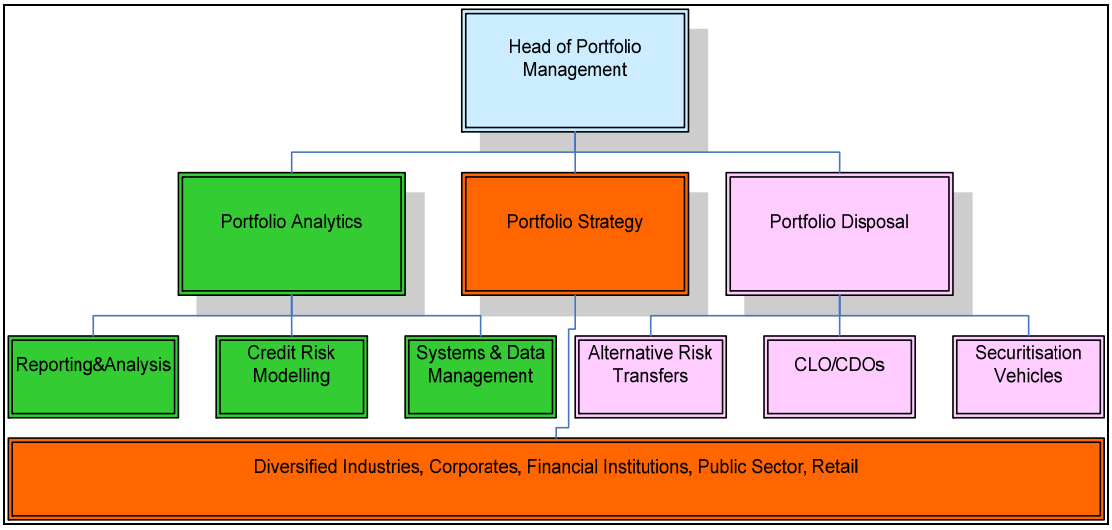
With the advent of Basel II, the Group Portfolio Management of a Basel II compliant bank becomes the backbone of risk and capital management activities. Its role and duties are of utmost importance, and the application range varies from getting "advice" to the offloading of the existing risky assets on business portfolios. In particular, Loan Portfolio Management Group's prime objective is to optimize the economic profit of the wholesale banking group's loan portfolio, within the limits of Group Portfolio Management's asset and capital management authorities. LPMG is a value center with profit & loss responsibility and its main value drivers can be summarized as follows:

1. Revenues generated by the interest, commitment fee income and participation fees.
2. Provisions
3. Capital charge.

LPMG will therefore rigorously focus on improving the credit quality of the loan portfolio, driving up "pricing" wherever possible, and reducing the capital tied up in the business. In this sense, the "decision rights" of the LPGM group can be extended to the following areas:

- Pricing for facilities falling within LPMG.
- Enhanced participation in engagement and credit committees.
- Separate capital allocation and unilateral rights for the disposal of assets.

Figure 5.5: Organization of the Loan Portfolio Management Group



Source: Author

As described in the above diagram, the Portfolio Manager for a specific loan book should be in a desired position to develop and maintain the group's loan pricing, portfolio reporting, performance tracking tools. This should include working with:

- Group Portfolio Management functions to align the pricing with the in-house RAROC models.
- Group Portfolio Management's strategy and disposal teams, the senior wholesale client management, the regulator and the central bank, the bank's internal and external auditors.
- Relevant product groups to implement all kinds of securitization structures if and when necessary[142].

As seen from the organizational structure above, the new Portfolio Management Group consists of the following functions:

- Credit Portfolio Management of diversified industries including public sector borrowers and financial institutions with relevant reporting and analysis
- Establishment of Portfolio Strategy
- Portfolio Execution and Disposal of the several exposures
- Management support

With respect to the processing of all credit proposals, the credit portfolio management and the portfolio strategy functions are the most important units. The relevant divisional responsibilities are fixed as follows:

Table 5.3: Responsibilities of Credit Portfolio Strategy and Management

Department	**Main Responsibility**
Credit Portfolio Management	- Credit Analysis in terms of RAROC, Economic Capital and Loss - Product Management and Pricing
Portfolio Strategy in	- Optimizing the banking book portfolio in terms of risk and return compliance with the portfolio parameters - Identifying and implementing hedging and disposal strategies

Source: Author

5.6.2.2 Implementation of the Filter Criteria

Group Portfolio Management (GPM) may agree with the Group Risk Committees and the Wholesale Client Groups on the parameters within which LPMG would seek to manage the loan portfolio. Those parameters may be defined as:

1. An economic loss for new facilities of a threshold amount or greater may be accepted with the facilities.
2. New borrower with a given rating upper and lower bounds may be introduced to the existing portfolio.
3. Industry concentration limits may be introduced. For example, the economic capital for a given industry will not be greater than a pre-defined percentage of the total portfolio economic capital.[143]
4. Credit migrations may fall down to certain notches, e.g. max. BBB-, according to the risk appetite of the bank's management.

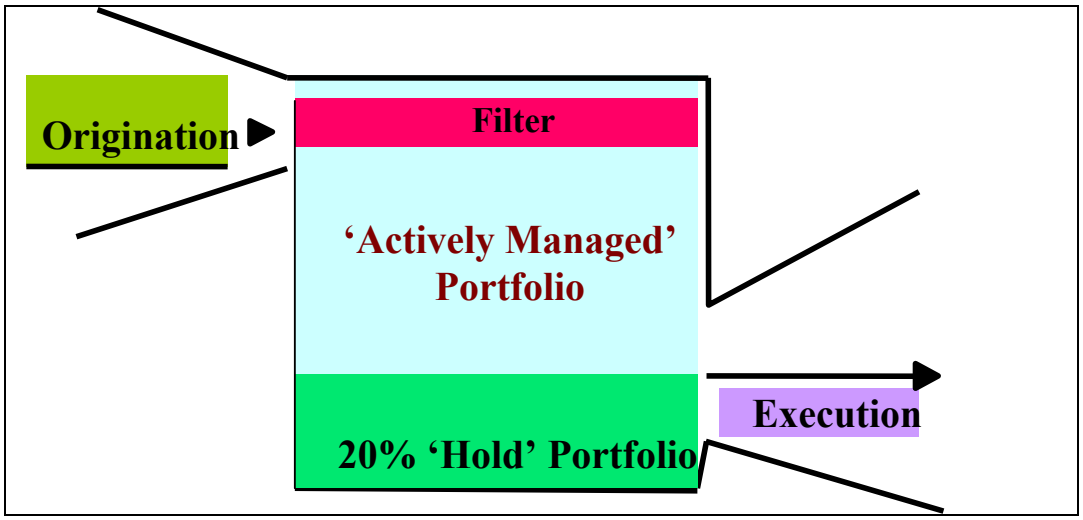
142 Basel II Accord, Paragraphs 538-683.

143 For the treatment of Concentration risks, pls. Refer to Basel II, paragraph. 770-777.

5. Portfolio economic capital should be less than a pre-defined threshold, e.g. 1 billion USD by year-end 2008.
6. Relationship economic capital may not exceed a certain level, e.g. 10 USD millions.

Once the parameters have been set, there may be noticeable migration in credit grades to lower levels, and a fairly consistent picture showing industry concentrations in certain areas such as telecom and utilities. Consequently, the Managing Board may ask the Loan Products Group to actively manage the portfolio in order to remain within the pre-defined parameters. In this respect, the Loan Products Group Management becomes the driving force behind the risk policy of a bank. Furthermore, a conservative bank management would impose "Filter Criteria" to screen some of the deals or transactions, before taking them into the "deal pipeline".

Figure 5.6: Portfolio Management Process



Source: Author

The filter criteria may determine those deals which need to be referred to Group Portfolio Management who will attach its advice to these proposals. The filter criteria may apply to the entire business of the LPG and will enable GPM to focus its resources where they are most needed, such as on the portion of the loan book which destroys value against the benchmark set. If the proposed facility exhibits one or more of the characteristics listed below, the deal should be referred to GPM that will provide further guidance. The guidance by the GPM will generally be a short instruction on the two main issues as follows:

1. Economic Loss or Profit of the transaction:

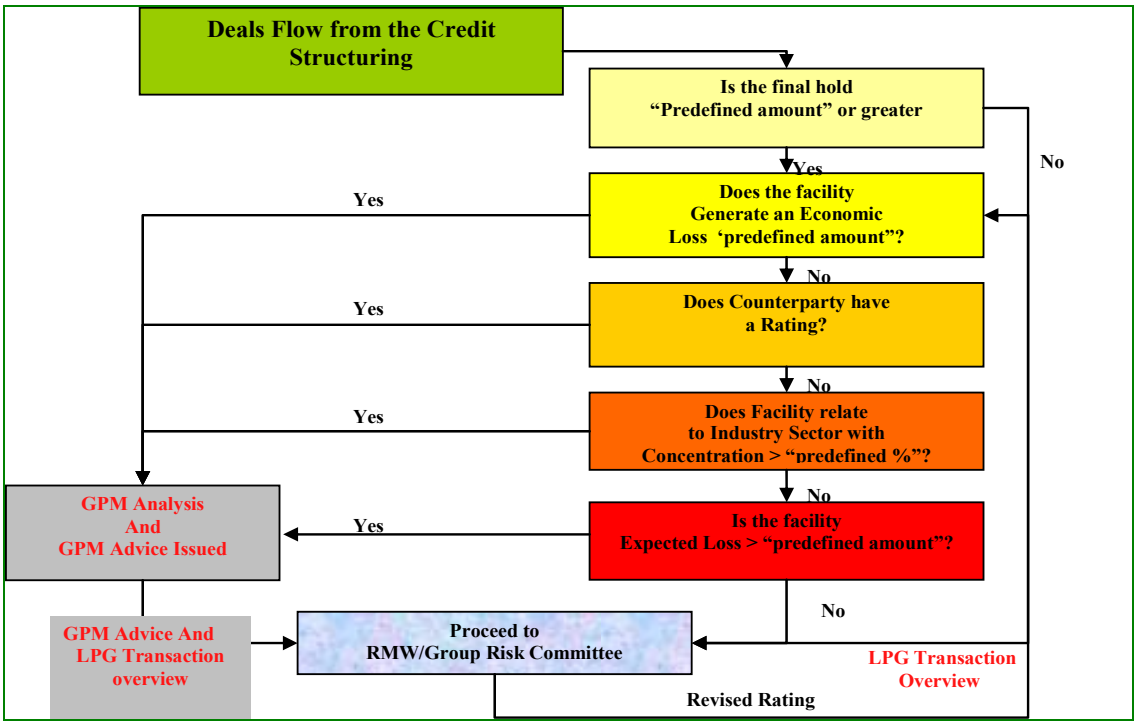
All deals referred to GPM which may destroy value by moving beyond the norms set by the filter criteria will need to be signed off from the client management group before processing through credits department. Value destroying deals, which are signed off, will be monitored by the GPM. If decided, the execution team has responsibility for the execution of the disposal programs devised by the portfolio managers. The arsenal of risk mitigation and disposal instruments includes cash sales, Collateralized Loan Obligations (CLO's) and credit derivatives. Depending on the market, some of these instruments may not be available, such as in Turkey

the use of credit derivatives and other structured products may be either limited or in existent.

2. Portfolio Parameters:

When proposed facility causes a breach of one or more of the portfolio parameters, GPM will investigate and may require exposure to be freed up through the cancellation of limits or the sale and hedging of assets. Portfolio parameters can not be standardized among banks, since they are strategic in nature and manifest the key core competence of the bank in doing its business. Therefore, the group-wide portfolio parameters are reviewed as the business of the bank evolves and should not be perceived as a cause of restriction by individual business units and product groups.

Figure 5.7: Dynamic Portfolio Management Filter Process



Source: Author

Facilities which breach these filter criteria cannot be processed through the credit system, unless there is a GPM exception or advice. As mentioned in previous discussions, a common reason that the business units forward value-destroying transactions to Loan Products or to Risk Management groups is to earn the associated revenues. The "Filter" and the application tools used by the portfolio manager should make it clear that there is a substantial difference between transactions that add economic value at a portfolio level, and those that do not. In addition, one can recall that many of the transactions showing an economic loss at the credit level also destroys value at the relationship level (i.e., the transaction's non-credit revenues were insufficient to offset the credit loss). Analyzing the returns on these transactions reinforces the position that the solvency consumed by such transactions might have been deployed to better uses.

5.6.2.3 Performance Tracking Reports of PMG

At this stage, a Pillar 3-compatible reporting example will be provided, in order to track performance among different transactions. The common denominator of the performance analysis will be the "value creation or destruction". In the example depicted below, there is a substantial difference between transactions that positively add economic value at the credit level, and those that do not. According to the *Value of Transactions under GPM report,* 84 transactions, currently reach up to 46% of the total, showed an Economic Loss. Of these, 18 (10% of the total) added value at the relationship level (due to the transactions generating offsetting non-credit revenues), while 66 (36% of the total) destroyed value at the relationship level versus 32% in the last report. In addition, recall that 66 of the 84 transactions that outwardly showed an economic loss at the credit level also destroyed value at the relationship level (i.e., the transaction's non-credit revenues were insufficient to offset the credit loss).

Table 5.4: Value of Transactions under GPM

In EUR (thousand)	Transactions with Economic Loss at Credit Level	Transactions with Economic Profit at Credit Level	All Transactions Progressed to RMW
Number of transactions	84	97	181
Credit RAROC (1)	2.8%	27.4%	14.7%
Credit Economic Profit (2)	-9,972	20,492	10,520
Total RAROC (3)	8.6%	36.1%	21.8%
Total Economic Profit (2)	-2,495	30,985	28,490
Economic Capital Consumed	129,856	121,240	251,096
Solvency Consumed	164,835	326,141	490,976
RWA Equivalent (4)	2,054,812	4,076,763	6,137,200
Credit EP before Capital Charges (5)	3,663	33,222	36,885
Per unit of RWA consumed (5/4)	18 bppa	81 bppa	60 bppa
Previous report	8 bppa	79 bppa	59 bppa
Total EP before Capital Charges (6)	11,140	43,715	54,855
Per unit of RWA consumed (6/4)	54 bppa	107 bppa	89 bppa
Previous report	69 bppa	119 bppa	105 bppa

1. Breakeven RAROC = 10.5% = Cost of Capital (i.e., there is a loss when RAROC falls below 10.5%).
2. Economic Profit is per annum, not a Net present Value over the lifetime of facilities.
3. Difference between Credit and Total RAROC is that the latter incorporates transaction's non-credit revenues (bundled or anticipated).
4. Solvency times 12.5
5. Credit Economic Profit plus 10.5% of Economic Capital.
6. Total Economic Profit plus 10.5% of Economic Capital.

Source: Example Report by a Global Bank using Moody's KMV Portfolio Manager (predecessor to RiskFrontier)

Analyzing the returns on these transactions reinforces the view that the solvency they consumed might have been deployed to better uses. Clearly, not all transactions that show an economic loss at the credit level are created "equal". Some include bundled or anticipated non-credit revenues that buy & sell strategies might unlock without using the balance sheet permanently. The case can be made, however, that the weakest transactions should never make it to Wholesale Credit Risk Management. On that point, it is also worth mentioning that GPM can not address whether such transactions would have damaged the relationships involved.

5.7 Closing Remarks to the Organizational Foundations of IRB Implementation

This chapter is motivated by the basic milestones of the paragraph 392 of the Basel II framework, which is that the Bank's overall credit management practices must also be consistent with the evolving sound practice guidelines issued by the Basel committee and the national supervisors. More specific procedures and guidelines will be established in the next chapter that deals more with the rating and portfolio methodologies, systems and data foundation during the implementation of IRB approaches. It is recognized that the successful transition from the current classical risk management of the banks to the structure described in this chapter requires an *actively managed change process.*

Transition management issues are to be addressed outside of this thesis. In addition to organizational changes related to management of all risks, the re-design specifically involves relatively large scale changes to the management of credit risk. The new credit risk structure represents a migration from a decentralized system to one with primarily centralized approval and decentralized monitoring and control. This change is intended to create a more efficient, reliable, and sophisticated credit functions and risk oversight methods. Despite the organizational and process changes, the credit granting principles of the banks in Turkey are unchanged at this moment. Similarly, the core industrial competence inside the risk management business units is used in a very limited sense. The measurement, monitoring, and control functions remain as vital and challenging components of the new, inter-dependent risk organization proposed in this chapter, and it is consistent with the BIS principles for best practices of credit risk management (September 2000). Under the BIS principles, the key features of the new, proposed credit risk organizational structure and processes should include:

1. Establishment of Industry and Product specialists.
2. A streamlined approval process supported by high technology and risk systems.
3. Maintenance of local risk oversight via regional risk officers.
4. Establishment of a system that measures, monitors and manages economic capital.
5. Establishment of independent model, process and validation units.

Alignment of the risk organization with the bank's commercial structure ensures that risk officers and analysts can add value to commercial functions. Today, the bank staff acts passively with respect to the incoming deals. The new organization includes immediate appointment of industry specialist teams and committees with regional responsibilities. Industry teams are centralized to support a knowledgeable and consistent decision making even at origination. To support the unique risk requirements of the trading operations, trading product specialists are to be appointed with local and regional responsibilities and are located near the trading activities. In the sprit of Basel II, there is much more to be done.

The proposed Basel II structures provide a platform for the shift from the traditional risk management 'policeman' role to one of risk consultant, providing value-added feedback to the commercial units.

The approval process should also be restructured to support consistent, knowledgeable, and timely decisions. The Basel II implementation creates more transparency, accountability and challenges the entire business and risk "culture" of the banks globally. Current progress in the risk culture and organization at Turkish banks will not be sufficient to meet regulatory compliance with Basel II. Standards will be expected to rise over time, and the successful bank needs to have the right culture in place to ensure that policies and processes drive continuous improvement. Banks need to look back at the organization over the last years, since the enactment of Basel II, analyze the areas where progress has been made, test the capabilities to spread progress in other areas and check if further improvements will be required for the future. Cultural change can be very difficult to manage quickly and effectively, but it will determine the degree of success in the organization.

Maintenance of independent risk oversight via the regional risk officers remains a critical component of the new infrastructure. Successful migration to the new risk management organization is dependent on the swift implementation of the wholesale client commercial strategies, in line with the bank's transition plan, including a set of activities as follows:

- Culling of the existing portfolios and asset classes
- Implementation of Loan Product Group function
- Deployment of effective loan pricing tools, RAROC and economic capital models
- Reduction of activities in non-core markets (geographical and/or products) through clear exit strategies.

The biggest challenge in transitioning to the new risk management organization lies with the harmonization and calibration of models, systems, data and parameters used by the bank for each business unit and product groups. Having established the organizational foundations and high-level principles for the implementation of the new accord, the next chapter will start building bridges for the parameterization, modeling, data and system aspects of the IRB implementation.

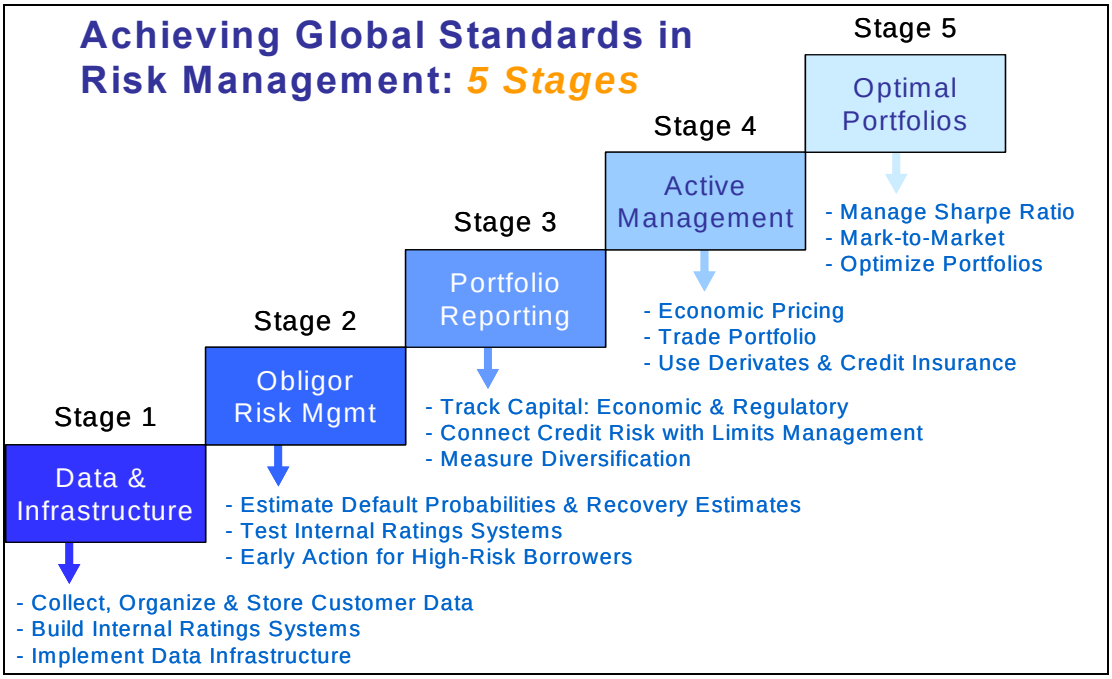
Chapter 6: The Implemention of Basel II IRB with Moody's KMV (Kealhofer, Macquown and Vasicek) Approach

6.1 Introduction

For the enhancement of risk management as well as the financial stability of the Turkish banking system, meeting the regulatory requirements of Basel II is a key driver of changes in the credit risk management practices of banks. However, the banks which will reap the rewards from the significant investment towards sound risk management systems are those that adopt international best practice and that are equally focused on enhancing the ongoing management and strategic direction of the business. The latter requires an equal focus on the economic capital and active portfolio management. While economic capital differs highly from regulatory capital, the same risk drivers (PD, EAD, and LGD) as well as additional portfolio considerations on migration and concentration risks provide the building blocks for the calculation of both.

While no single financial institution is typical, the five steps, or stages, can be identified that financial institutions typically experience on their way to advanced credit risk management.

Figure 6.1: Building Blocks of Credit Risk Management from Moody's KMV perspective



Source: Moody's KMV

The achievement of the full benefits of Stages 4 & 5 is partly dependent on ongoing developments inside the financial system in Turkey, especially the development of structured finance and derivatives markets would enable sufficient pricing flexibility in the application of risk based pricing. However, the internal capabilities to take advantage of these developments and to achieve still meaningful benefits from single obligor risk measurement in the absence of such market instruments, are derived in Stages 1-3.

It is worth noting that the building blocks for addressing the Basel II IRB requirements are also addressed in Stages 1-3, with the difference between the foundation and advanced IRB (F-IRB and A-IRB) being essentially the degree of data underpinning, data reliability and bank specific focus, underlying the estimation of the core risk components (PD, EAD, and LGD).

While historically, deteriorating credits have been a source of severe underperformance of bank portfolios, many institutions struggle to introduce a framework for effectively measuring and managing this risk arising from the nature of credit portfolios, i.e. the credit portfolio distributions tend to be highly skewed and fat-tailed due to concentration and credit deterioration, which make it difficult to measure expected losses/provisions and the uncertainty around these, resulting in unexpected losses and extreme losses due to correlated tail events[144]. Issues such as lack of data or the difficulty of cultural adjustment to Basel II have posed non-trivial obstacles on the path to improvement. Please refer to Chapter 5 for details on the organizational foundations that need to be in place for a successful implementation of the IRB approaches. Towards Basel II IRB compliance, it is of key importance for Turkish banks to seek solutions that offer an integrated and objective framework to help meet the growing needs of the bank to implement ever more sophisticated approaches to credit risk management. Equally important is the Pillar 2 considerations that shift focus towards more effective portfolio management and economic capital. Indeed, some regulators warn that the overall capital requirements may be the Pillar 1 capital plus Pillar 2 for some banks, as discussed in detail in Chapter 3, sub-section 3.4.3.3 Pillar 2: Role of Supervision.

In order to develop a comprehensive, but appropriate, solution for the Turkish banks, the thesis will focus on three core dimensions;

1. Data
2. Systems / Processes and
3. Methodologies

These 3 dimensions prove extremely powerful in providing the structure for banks' Gap Analysis of F-IRB or A-IRB and will be pivotal to the phasing of the solution sought in this thesis.

During the field research, it became apparent that a consultant or a solution provider can only assist the Bank to develop a solution, which has the potential to be compliant, but it can not guarantee the compliance at any level of Basel II. Therefore, Turkish banks need to understand that compliance is determined primarily by the bank itself and it should reflect the following:

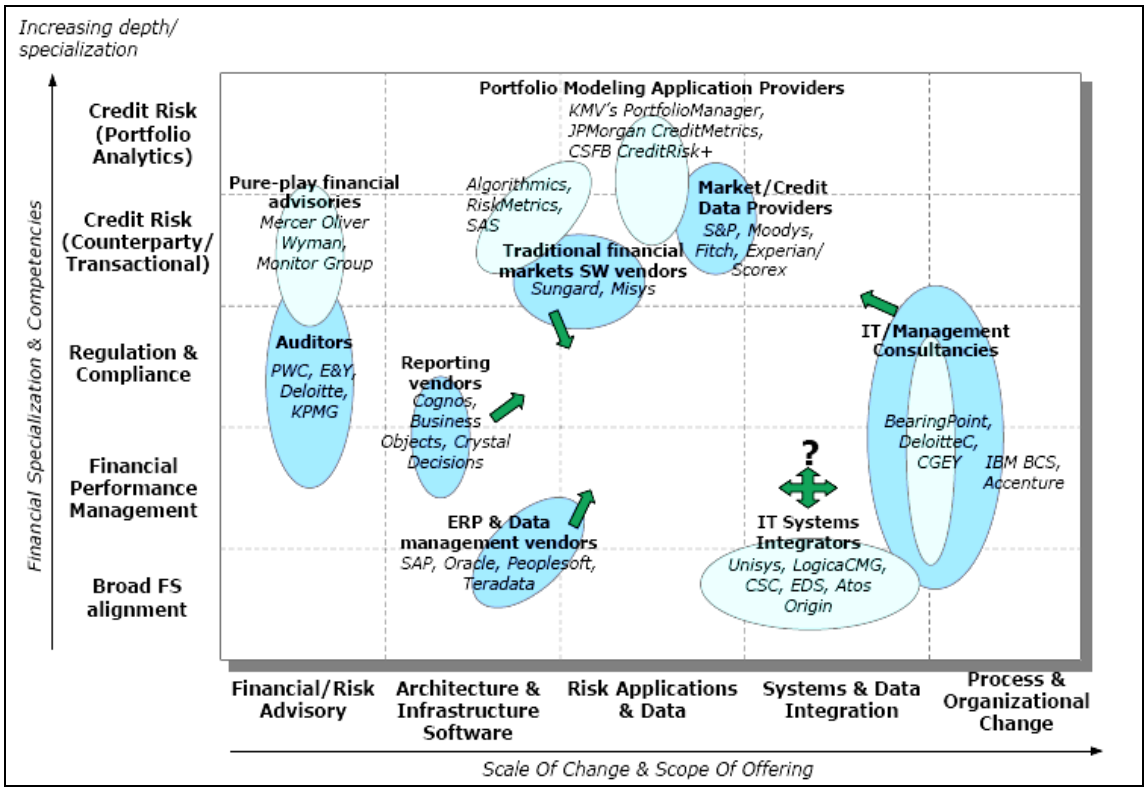
1. Underlying data foundation, and quality of the ongoing collection and storage process,
2. Ongoing manner and rigor with which the bank applies the processes and systems developed to assess the core risk components (PD, EAD, LGD) and,

144 In probability theory, Kolmogorov's zero-one law, named in honor of Andrey Nikolaevich Kolmogorov, specifies that a certain type of event, called a tail event, will either almost surely happen or almost surely not happen; that is, the probability of such an event occurring is zero or one.

3. Ongoing manner, in which the bank utilizes the resulting risk measurements in making its credit decisions and managing its business.

With that in mind, it is important to briefly highlight the key competences of Moody's KMV solutions as part of the implementation project.

Figure 6.2: Industry Landscape of Basel II Solution Providers



Source: Datamonitor

As illustrated in the diagram above, Moody's KMV is the world's leading provider of quantitative credit analysis tools to banks in the credit risk measurement and credit risk portfolio analytics. The company creates products and services based upon a sophisticated application of modern financial theory and statistical analysis transferring these into key insights to manage credit. Its scope of offering involves only the credit risk aspects of the portfolio and is regarded a niche provider in this highly specialized and in-depth field. Moreover, it has assembled the largest public and private company default and loss database in the world, containing 33 years of information on over 8,000+ public and 250,000+ private company default events for a total of approximately 49,000 public and 2.8 million private companies, healthy and distressed, around the world. Also, Moody's KMV has over 3,000 LGD observations globally on public & private firms; rated & unrated debt; loans & bonds across 23 years. Because of this rich data set, Moody's KMV is in a unique position to create credit risk models of unparalleled breadth and depth around the globe.

This ability to make use of vast amounts of timely and forward looking information allows for frequent updates as well as validation and calibration/recalibration of its models with new data and research on an ongoing basis. As part of the Basel II and discussed in Chapter 5, sub-section 5.2.1.9 Corporate Governance and Oversight, bank must ensure that the rating system is working properly and the models and systems

have to be reviewed by an independent function or internal audit at least annually. By reviewing its solutions regularly, Moody's KMV is committed to support its client needs for up- to-date systems and models when it is necessary.

In the absence of data, some solution providers bucket risks or simply ignore key aspects of it such as granularity, differentiation power among good and bad credits as well as frequency of information. Some also expand their scope towards software, systems, and consulting, which tend to lack focus on the complex nature of capturing, analyzing and reporting credit risks. As the implementation workflow unfolds, data standards required by the Basel II accord will be stressed in more detail as appropriate. In brief, Basel II requires that data collected beyond the implementation date must comply with the minimum standards, unless otherwise stated, as detailed in Chapter 5, sub-section 5.2.1.8 Risk Quantification and Data Standards. In a sense, banks need to back up the validity of their models and assessments with underlying data foundation. As mentioned, Moody's KMV has the most extensive data in the world that is used in the prediction of default and loss estimates as well as quantitative analytics capability. Consequently, the thesis will examine the capabilities of Moody's KMV solutions and provide suggestions for the implementation of those solutions on the path towards the Basel II IRB compliance.

6.2 Scope of Work

In the field research, it has been observed by the author that international banks typically proceed in a phased manner to ensure that each successive phase of the Basel II IRB project is yielding the desired results, and to provide scope for changing or altering the tasks for the subsequent phases depending on the progress. The exact nature and duration of each phase depends to a considerable degree on the specific data, infrastructure, models to be implemented and cultural environment of each bank, and thus varies considerably. In the context of the thesis, this chapter proposes an indicative scope of implementation work and phasing based on the experience of *Moody's KMV with banks globally.*

The indicative phases include:

Phase 1: Bank-specific Gap Analysis
Phase 2: Data Foundation
Phase 3: Internal Rating System Infrastructure – RiskAnalyst
Phase 4: PD Models (such as EDF models)
Phase 5: Single-Obligor Assessment Processes
Phase 6: Development of an IRB Validation Framework
Phase 7: External Models for Benchmarking
Phase 8: Roadmap to A-IRB
Phase 9: Portfolio Analysis & Economic Capital Management - RiskFrontier

This chapter will outline the key elements of the solution intended to assist banks achieve their desired F-IRB and A-IRB status in appropriate time frame as well as implement an Economic Capital model.

The solution follows a logical progression starting with the Gap Analysis at Phase 1. Following Phase 1, it continues laying out the basic data infrastructure in Phase 2, and

proposing the implementation of RiskAnalyst in Phase 3, the industry leading internal rating assessment platform. RiskAnalyst will facilitate ongoing data collection and storage, obligor assessment including spreading and forecasting, facility risk assessment, and the application of the risk quantification tools.

An effective internal rating system will always be based on a mixture of quantitative models and expert judgment scorecards, reflecting the fact that some industries / segments will not produce enough default observations to enable development of statistically validated models. In such industries / segments expert judgment scorecards based on a recognized rating methodology, provide the most appropriate solution. The application of the proven rating methodology provides the confidence only otherwise obtainable from a full statistical validation. Further, a rating methodology consistent with that underpinning recognized external ratings, is likely to maximize the potential for a valid linkage to the default experience associated with the rating agency ratings history. RiskAnalyst offers a robust rating platform to deploy many rating models based on different data foundation, statistical models as well as expert judgment.

In addition, a series of powerful PD models (e.g. the EDF models) in Phase 4 will be examined for use in benchmarking and providing independent assessment of obligor risk. Any departments in the bank that actively trade corporate credits (such as Treasury or Capital Markets) may also use the EDF tools, as primary models to perform more effective and timely evaluation of risks. PD models and validation of such models will be discussed comprehensively in Phases 4-7. After Phase 7, the bank will be positioned to reach F-IRB (Foundation IRB) stage, and be able to apply these tools and process effectively in the ongoing credit management process. In Phase 8, the thesis will explore the further steps to comply with A-IRB and introduce the Moody's KMV LossCalc that provides LGD estimates for different debt types under different seniority, collateral, country and industry conditions. Finally, Phase 9 will start taking into consideration the portfolio, aggregated risks and the determination of economic capital.

The phases outlined above represent the concepts involved in enhancing credit risk management within the bank that goes beyond the Basel II IRB and stretches further to Pillar 2 portfolio and economic capital considerations. However, the actual timing of the work in the phases is likely to overlap, reflecting the inter-related nature of the work and concepts. In this context, to make the understanding of the following sub-sections easier, it is worth to highlight some dimensions to gain insight into the basics of model building and testing.

6.3 Phase 1: Bank-specific Gap Analysis

An essential starting point for an implementation project of any scale is the development of a clear understanding of the current credit risk environment within the bank, and the resulting gaps which need to be prioritized and bridged to enable successful achievement of the project objectives. This would involve a review structure addressing such dimensions as:

1. **Data:** The underlying data held by the bank relating to financial statements, previous default and loan loss experience, facility terms, collateral data.

2. **Systems / Processes:** The existing risk rating process, credit application, approval and monitoring processes, IT/systems infrastructure, internal management reporting processes to the senior executives and the board on all aspects of business credit risk.

3. **Methodologies:** Single obligor credit risk measurement, portfolio capital allocation decisions covering counterparty concentration risk, industry concentration risk, etc.

In Turkey, without a large number of established default-bankruptcy data, estimating the "true economic default" and "true economic losses from default" patterns become much more complex and highly subjective exercise. In this sense, the Re-aging (counting of the past days due) of the existing facilities become a real problem from the point of defining delinquent exposures for IRB purposes. With paragraph 458, Basel II provides clear definition and conditions on re-ageing per facility, which is usually abused by the banks in Turkey by showing off the past-due accounts as if they are non-delinquent. Same misusage applies to the treatment of overdrafts. Usually overdrafts extended over 180 days are not seen as "default", even surprisingly financed by other "bad debt credit card financing institute". Basel II would put an end to the disaster of credit card defaults in Turkey, as banks are obliged to have rigorous internal policies for assessing the credit worthiness of customers who are offered overdraft accounts through pp 459. The Gap Analysis therefore, should include a review of the actual default situations in detail within the local banking system. Only when the local definition of default is determined through actual observations, banks can determine the transition/adjustment from local default experience to Basel II definition of default[145].

A key component of the Gap Analysis would be to understand how defaults occur within each bank. Turkish banking system is rapidly growing, and has evolving economic structures that are quite different from the majority of the banking systems, to which the BIS frameworks are being applied. Without this understanding, offering the standard "here are the tools/skills the leading banks have but good luck" type analysis will simply create a misleading, and ultimately unrealistic objectives for the banks, as the standard analysis do not necessarily focus on the economic reality surrounding them.

The Gap Analysis should also assess each bank's expertise, processes, systems and sometimes personnel spanning senior credit practitioners, rating specialists, data and modeling specialists, loss specialists, portfolio specialists, systems specialists and industry- and product-related business units as stressed in Chapter 5, sub-section 5.2, Key Issues in Implementing the IRB. Furthermore, ICAAP will determine the effectiveness of the Basel II implementation at the bank through use tests. The typical use test candidates will involve the monitoring and capital management functions on business unit (product and industry-related) and group level. Please refer to Chapter 3, sub-section 3.4.3.3.1 for details on the ICAAP. In the absence of this expertise, processes, systems and personnel, most Turkish banks are expected to seek solutions

145 Basel II, Requirement 7: Risk Quantification, Paragraph 452 defines the default as 90 days due. According to BRSA, to change the credit risk environment, the industry should start from the definition of default. As new loans are extended at the end of 90 days and the repayments are prolonged, the outstanding credit exposure is accepted prematurely as a "non-defaulted" loan. Contrary to Basel II, paragraph 453, the bank never puts the credit obligation on non-accrued status.

externally for knowledge and experience transfer, which will ultimately benefit them in the long run.

During Gap Analysis, interviews with key members of the senior management should also ensure a better understanding of the strategic framework for the banks. The outcome of the Gap Analysis is in fact deeply impacted by the strategic profiles of the management of the banks. The management's propensity to take measured risks, desire for the capital efficiencies, and the net income stability will help to provide the banks with assessments of the credit risk gap, which are better understood and explained. The approach will also assist the banks to better assess the costs and the benefits of obtaining various tools/skills within the context of strategic resource allocation and the bank's specific vision. It is quite common for this Gap Analysis phase to be undertaken prior to the commencement of the implementation project, and form a basis for the final project specifications and design. This enables the proposed solution to be more effectively designed and executed earlier on in the process.

6.4 Phase 2: Data Foundation

A Basel II-IRB solution needs to have the ability to bring acknowledged industry best practice to the assessment of all risky industry segments, irrespective of whether they are high default in nature, and thus generally data rich, or low default in nature, and thus data poor. The appropriateness of the data available is critical to the long term effectiveness of all risk management processes. This is particularly true of data on default events and recovery issues, which are difficult to collect retrospectively. Good data infrastructure should encompass data relevant to the assessment of single obligor risk, including an appropriate level of financial statement data and defaults, facility risk, based on an appropriate level of facility and collateral data, LGD and EAD, based on loan loss and recovery experience and historical rating performance of the relevant obligor and its facility.

Under Basel II 'Risk Quantification' requirements, a bank may use data on internal default experience for the estimation of PD and internal loss estimates for the estimation of LGD. Minimum data requirements of PD and LGD are 5 and 7 years, respectively[146]. There is a significant challenge in capturing sufficient data (sufficient history, quality, quantity, breadth, and detail) to develop internal models in Turkey as identified in the latest Banking Sector Basel II Progress report.[147] In this report, major banks reported that, 56.8% of problems to be associated with PD, LGD and EAD-related data, either insufficiency, incompleteness or simply unavailability of the needed data[148]. To meet the Basel II IRB's minimum data standards is of key importance for a successive framework at the organization, as stresses by Chapter 5, sub-section 5.2.1.8 Risk Quantification and Data Standards.

Although estimates of LGD and EAD based on a bank's own data are not required for F-IRB purposes, the scarcity of such loss related information and the typical difficulty, where banks have to go back to collect such data historically means, that it is extremely

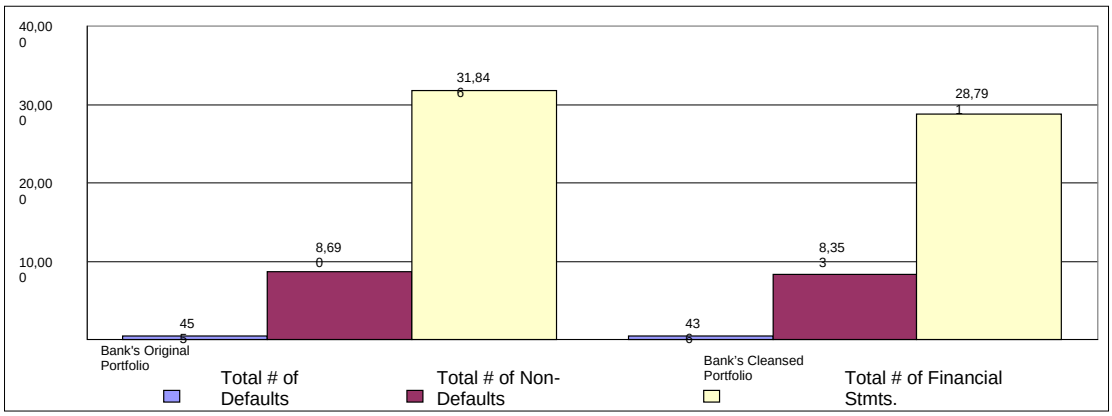
146 Basel II, Requirement 7 Risk Quantification, Paragraph 463,466 for data to be used for PD estimation and pp.472 for LGD estimation.

147 Banking Sector Progression Report towards Basel II, Fig.2 Main Issues and Problems, BRSA, December 2006

148 For examples of required data types, refer to Appendix VII.

important to make an early start on the structured and disciplined collection of such data as it arises. Often banks do not have enough data to actually build reliable models, but if they have data, much of it is not immediately suitable for modeling purposes due to some quality issues. Therefore the initial step involves the *cleansing of the data* to ensure, it is in a form useable for modeling and the subsequent assessment of whether there is sufficient to proceed after cleansing.

Figure 6.3: Standardized Data Cleansing Process



Source: Moody's KMV

This phase should not only include data cleansing and capture but also reporting that outlines the characteristics of the data set for further model development. By examining this data, banks will be able to determine which models may be needed, which models would be possible to construct, and which areas would need further data gathering.

To start with, an analysis of the industry / segment structure of the bank's obligor portfolio, both in terms of performing and defaulted obligors need to be undertaken in this phase. This analysis is critical to determining, which segments in the bank's portfolio can support statistically based PD modeling, and which would more appropriately be addressed using methodology based Rating Estimate Templates. *The key to this issue is the number of defaults available to support PD modeling.* When the size of defaults is insufficient or incomplete, then banks tend to use scorecard modeling approach using a Rating Estimate template.

Where only limited data are available, the use of pooled data across institutions is also recognized by Basel II[149]. However, a bank must demonstrate that the internal rating systems and criteria of other banks in the pool/consortium are comparable with its own. In most countries, banks sought to establish *Data Consortium* to support the development and maintenance of probability of default and LGD models. Moody's KMV's Credit Research Database (CRD) Initiative is one of them and it started in 1996 to source credit risk data and to solve data consolidation problems of several banks in a given financial system. In the absence of sufficient, complete and available data, the Data Consortium should:

1. **Satisfy the need for more credit risk data:**

149 Basel II , Requirement 7: Risk Quantification, Paragraph 461-462.

Generally, participation in consortium will improve banks' infrastructure for gathering credit risk data and leverage their own data to draw additional credit risk data from the pool. *Internal models developed with more default and recovery data tend to be more powerful, accurate and consistent across different sectors, size, and industry across time periods*. Therefore, the Data Consortium can enlarge available data while maintaining 'own credit experience' requirements[150]. Participants draw more default data from the pool and get complete copies of the non-default data for benchmarking. This enhances their data in model development and overcomes concentration and bias in the internal models that they develop. The consortium should also establish group's infrastructure to capture on-going credit experience data for annual testing[151] at the same time use Basel II default and loss definitions[152]. The consortium should serve to increase market transparency in the spirit of Basel II[153]. Consequently, Data Consortium needs to comply with Basel II as the starting point for default definition where default event occurs when: either or both of the two following events have taken place as defined by Paragraph 452.

- The Client considers that the obligor is unlikely to pay its credit obligations to the Client in full, without recourse by the Client to actions such as realizing security (if held). The elements to be taken as indications of unlikeliness to pay include: Non-accruals, charge offs, account-specific provisions arising from a significant perceived decline in credit quality, credit-relates economic loss, troubled debt restructuring or bankruptcy.

- The obligor is past due more than 90 days on any material credit obligation to the Client ("90DaysPastDue"). Overdrafts will be considered as being past due once the customer has breached an advised limit or been advised of a limit smaller than current outstandings ("Overdraft").

In daily praxis of a global bank, following events may trigger a default: Cheque Return, Watch List, and Past Due above 90 days, Debt Restructuring, Demand for Payment, Experts Definition, Provision, Writing Off, Bankruptcy and Assets Liquidation.

To ensure accurate default capture, the detection of default events in the pool should be automated with accordance to the default definition above through specific algorithms. After proper identification of default events, it is also important to filter through the pools for minimum two consecutive annual financial statements where the most recent statement date is 24 months immediately prior to default. This is of key importance in the development of models as well as validation since defaults are only useful if matched with financial statements that have the financial variables/factors, which may/may not have predicted a default event.

In preparation of A-IRB, the Data Consortium should also filter for recovery transactions tracked for defaults. This requires capturing data regarding the amount, timing and source of the recovery cash flows and comparing it to perceived value at

150 Basel II , Requirement 3: Rating System Design, (v) Use of models, Paragraph 417.

151 Basel II , Requirement 3 Rating System Design, Paragraph 429

152 Basel II , Requirement 7 Risk Quantification, Paragraph 452, 456 and 460

153 Basel II , Requirement 7 Rating System Design, Paragraph 418, 420 and 421

various points in time. In turn, this recovery data can be used for estimating collateral 'realization rates', which are the building blocks of 'ultimate recovery rates'.

2. **Increase the availability of high-quality data in the market:**

Good data is the foundation of superior risk rating systems. Requirements stated in Basel II is one manifestation of encouraging banking supervisors to ensure data quality in their markets, to sustain financial market stability. National supervisors will be looking to assess the banks in their ability to identify the nature of each risk, explain the ways to quantify and mitigate such risks and apply best practice in doing so. Hence, high-quality data will be in the minds of national supervisory during the SREP. Further details on the SREP can be found in Chapter 3, sub-section 3.4.3.3.2.

A common reason for data holes is the inadequate policies and procedures for tracking pre-default and post-default financial statement information. Data Consortium should implement a set of rules in accurately capturing financial statements, spreading policy and procedures.

To prove up to date and well specified rating systems are present, formal and statistically significant tests must be performed on financial statement data to ensure it is of high quality, in sufficient numbers, with sufficient breadth (time, size, industry…), from portfolios similar to where the model is used, with default events that are regulatory compliant, and with defaulters matched to the prospective quantitative inputs. However, most Turkish institutions face challenges in this area as highlighted in the banking progress report.

Another common reason for banks' systems to have data holes is that links between loan data and borrower financial performance data are mainly non-existent or inaccurate. In this respect, Data Consortium should perform initial linking and check links at each submission by banks. It should advise banks on expanding and maintaining links and provides periodical feedback to participants so that long term data quality can be achieved throughout the industry.

To create a market discipline referred in Chapter 3, sub-section 3.4.3.4, Pillar 3, Discipline of the Market, the Data Consortium should have in place extensive data quality controls/rules that will apply to participant banks and encourage the improvement of data quality after each data submission to the pool. This is not an easy task as it involves extensive knowledge of local accounting and credit principles coupled with credit default and loss data experience in standardization across a wide variety of participant bank systems. Apart from collection of data, data sampling rules should also be in place to create the optimal data samples for internal model development. Finally, it is important to note that the Data Consortium adheres to the confidentiality needs of participant banks as well as the regulatory body, e.g. BRSA. Generally, obligor names and identifiers should not necessarily be required for participation and participating bank data should be further anonymized when received to protect confidentiality of participant.

3. **Promote benchmarking:**

In the absence of benchmark PD and LGD models in Turkey, pooled data in a consortium can be used in the development of such benchmarks for further model validation and calibration purposes. Although not a primary driver to Data Consortium, it can serve in the development of external benchmark for internal PD and LGD models. As part of the validation of internal rating systems under Basel II IRB, banks can back-test their internal models as well as benchmark them against externally available data or models.[154] Accordingly, Data Consortium ought to have a reporting function where reports by size, industry, and portfolio can be obtained, for benchmarking purposes.

6.5 Phase 3: Risk Analyst as an Internal Rating System Platform

Basel II compliance with minimum requirements requires banks' credit risk management practices to be accepted by the National Supervisors[155].

Each supervisor will develop detailed review procedures to ensure that, banks' systems and controls are adequate to serve as the basis for the IRB approach, determined by the SREP. Please refer to sub-section 3.4.3.3.2 in Chapter 3. The term "rating system" comprises all of the methods, processes, controls and data collection and IT Systems that support the assessment of credit risk, the assignment of internal risk weights and the quantification of default and loss estimates[156]. The main idea behind the imposition of the IRB systems is a meaningful differentiation and reasonably accurate estimation of credit risks. In this respect, RiskAnalyst™ platform has been used by institutions around the world to rate millions of credits and many of these institutions received approval from regulatory supervisors on their credit risk management practices.

An effective internal rating system should facilitate the development of credit strategy, planning and reporting framework, which are the main responsibilities shared by the GRM and RMW functions of the organization as proposed in Chapter 5, sub-sections 5.4 and 5.5. Identifying the most risky borrowers, pricing for risk, and measuring regulatory and economic capital can not be achieved without an accurate internal rating system. Without it, it is also very difficult to really take advantages of active portfolio management that entails buying and selling of portfolio of assets, which lies with the LPMG in Chapter 5, sub-section 5.6.2. In this spirit, MRAAG, Moody's KMV Risk Advisor Advisory Group, helps ensure that RiskAnalyst solution utilizes industry best practices to produce credit risk assessments for single obligors. MRAAG is a consortium of financial institutions that implemented RiskAnalyst solution across their organizations and perform regular meetings in the year to suggest enhancements to the solution and exchange ideas. Consequently, the thesis will explore the implementation possibilities of this solution in this chapter.

RiskAnalyst sets the foundation for consistent and accurate risk analysis on commercial borrowers by collecting, analyzing and storing financial statement data. The tool's

154 Basel II Working Paper No.14, 'Studies on the Validation of Internal Rating Systems', Key Components of Validation, Figure 1. Validation Components, February 2005

155 Basel II, Minimum Requirements for IRB Approach, Requirement 1 and 2, Paragraph 388 and 392

156 Basel II, Minimum Requirements for IRB Approach, Requirement 3 Rating System Design, Paragraph 394

centralized database powers the configurable and highly organized framework that brings together the inputs required by an internal rating system. These inputs can aid in rating model development/evaluation and internal auditing. RiskAnalyst organizes data at both the borrower and facility levels forming the basis for portfolio analysis.

Figure 6.4: Rating Summary Dialog Box of RiskAnalyst™

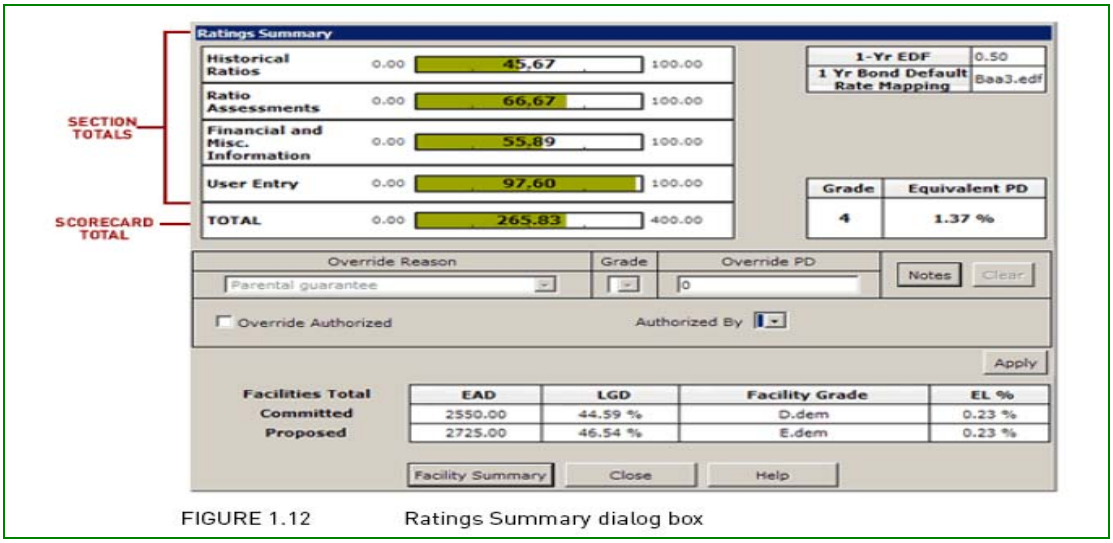


FIGURE 1.12 Ratings Summary dialog box

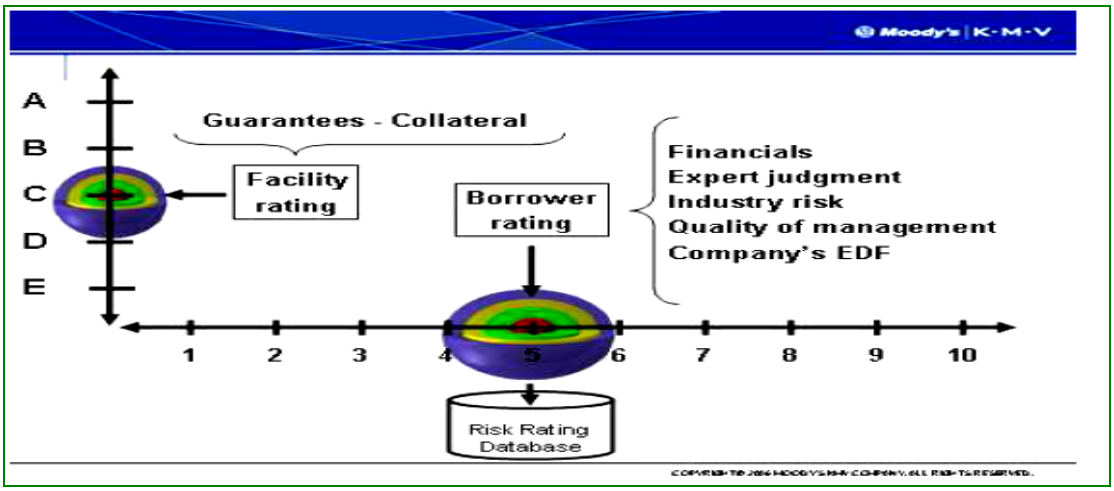
Source: Moody's KMV RiskAnalyst User Guide

Basel II 'Rating System Design' requirements detail that the rating system must have two dimensions[157]. This requirement was also discussed in Chapter 5, sub-section 5.2.1.2 when identifying the key organizational issues relating to the foundations of a Basel IRB-compliant bank. Similarly, when assessing the risk associated with providing credit to borrowers in RiskAnalyst, there are two dimensions to the risk assessment: 1) the risk that the borrowers will default (obligor risk) and 2) the risk associated with any recovery of obligations from the borrowers if they default (facility risk). RiskAnalyst includes two key modules to assess these risks, which are the *Borrower and Facilities modules*. The borrower rating in Borrower module provides an assessment of the credit quality of the firm, which produces a score/grade that can be mapped to PD. The LGD rating in the Facilities module considers transaction features and any associated credit risk mitigants, compliant with F-IRB. If the A-IRB approach is the goal, RiskAnalyst can also be customized as such to accommodate the requirements of internal LGD and EAD models. Schematically, the Ratings Summary below details the Borrower grade, PD, EAD and LGD produced by the RiskAnalyst system.

A good rating system separates borrower risk from facility or transaction risk. In general, facility risk-based rating systems tend to create a huge 'bunching' into a few rating categories as illustrated in the figure below. This is mainly due to facility risk based rating's focus more on the structure of the deal and collateral. In RiskAnalyst, the distinction has been made between borrower and facility risk and scored separately. This works well in terms of the credit risk management activities since there is usually little one can do about the borrower risk, but negotiations can take place extensively with the bank's customers with regards to the structure and collateral of the transaction.

157 Basel II, Minimum Requirements for IRB Approach, Requirement 2, Paragraph 396

Figure 6.5: Key Characteristics of Good Internal Rating Systems[158]



Source: Moody's KMV

RiskAnalyst's rating framework is powered by a set of calculation engines linked to a centralized database that bring together in a consistent manner the data elements required by best-practice internal rating systems. These data elements help improve the credit process and can be used to support further model validation and development work in the future.

RiskAnalyst solution consists of several components:

1. Data Capture with model deployment and archiving
2. Borrower Rating - Predefined Financial Templates and Rating Templates for several industries, banks and insurance companies
3. Facility Analysis - Built-in Basel II Foundation IRB, LGD calculations or customized LGD templates
4. Set of construction tools to aid model maintenance and tuning (customization capabilities)

6.5.1 Borrower Rating

The borrower module is designed to enable the usage of three different complementary methodologies for the assessment of borrower credit quality:

1. Internal quantitative default probability (PD) models

Many commercial lenders (particularly those working towards Basel II IRB compliance) seek to develop and deploy quantitative models based on their own internal data (internal rating models), which if able to perform at acceptable levels of accuracy, are often considered to better reflect the characteristics of their portfolio and credit culture.

158 Brammer, M, Moody's KMV, "Five Characteristics of a Good Internal Risk Rating System", CreditRisk.net, p.7

2. External quantitative default probability models, such as EDF models

Some lending institutions also use validated quantitative PD models, such as the ones developed externally, within their credit risk system, as an alternative response to the problem of a shortage of default data. These models, which provide an absolute measure of risk defined as the probability of default, can be used to provide a valuable benchmark. This type of model is sometimes referred to as 'external' because it is developed, validated and calibrated to default using data external to the lending institution and because the factors, weights and calculations used within the model are not changed by individual institutions. These will be discussed further in Phase 4 in sub-section 6.6.2 of this chapter.

3. Expert judgment based scorecards or rating estimate templates

For those banks with limited historical obligor data, particularly on defaulted obligors, these models or scorecards may only derive a relative measure of risk, such as a bank grade, that may, after calibration, be mapped to an actual default probability. This type of 'internal' model / scorecard also offers the opportunity to include additional, possibly qualitative, risk factors (e.g. management quality) into the analysis, i.e. expert judgement based scorecards or rating estimate templates.

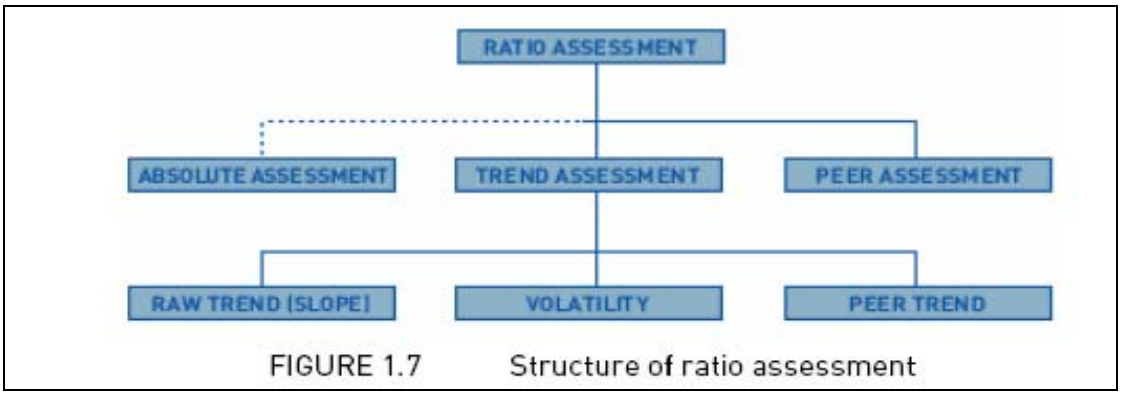
In compliance with Basel II 'Rating System Design' requirements, a bank may utilize multiple methodologies/systems within each asset class[159]. Banks must not allocate borrowers across rating systems inappropriately to minimize regulatory requirements. It is important to highlight that RiskAnalyst platform allows banks to use multiple risk rating models and hence configurable utilities can be set to present the models appropriate to the type of asset class being rated. RiskAnalyst standard scorecard analyses are based on predetermined information by MRAAG, which are referred as 'case types'. Case types determine the inputs used in the models and their weightings. For each model for a given asset class (retail, corporates, banks, SMEs, etc) the underlying case types will be the source of input selection and model weightings. Given bank's portfolio and the breakdown of asset classes, case types should be filtered for appropriate model selection. In addition, bank can filter case types by industry, country and company size to determine the appropriate case types for a given model.

6.5.1.1 Financial Ratio Analysis

In typical corporate lending, internal credit analysis begins with an analysis of key financial ratios, which might be as simple as a comparison of each ratio's value to some absolute standard. RiskAnalyst supports this type of analysis but can additionally incorporate an analysis of trend across multiple periods, in terms of both the slope and volatility of the trend. It can also compare the value of a ratio with quartile values of a comparable peer group. These analyses are then combined to produce an overall ratio assessment where the outcome is the weighted sum of peer/trend analysis and absolute assessment as illustrated below.

159 Basel II, Minimum Requirements for IRB Approach, Requirement 2, Paragraph 395

Figure 6.6: Ratio Assessment Structure



Source: Moody's KMV RiskAnalyst User Guide

6.5.1.2 Peer Assessment

This is the assessment of the ratio's performance against industry values. The calculated value of the ratio for the current period is compared to the industry values to derive the company's ranking. The set of benchmark fixed points need to be entered to rank against the peer group. As discussed in Phase 2, the data obtainable from the Data Consortium will be crucial in the effective use of peer analysis. Note that SREP involves the national supervisors to seek evidence where Trend and Peer Assessments of RiskAnalyst can assist such that the bank's model is powerful or similar compared to the practices that its peers take on. Please refer to Chapter 3, sub-section 3.4.3.3.2 for the UK FSA's comment on the use of peer comparison as a review tool when assessing the reasonableness of bank's practice.

6.5.1.3 Trend Assessment

This is the weighted combination of the trend analysis and the volatility assessment of this trend. In this context, the raw trend analyses consider the trend of the ratio over the periods defined. Hence, this requires a sufficient history of financial statements. The volatility assessment is an extension of the raw trend analysis. The volatility assessment, in general, will be unfavourable if there are wide fluctuations of the values across periods. If the trend shows stability and relatively an even pattern of change, then the assessment will be favourable. Even the most favourable volatility assessment may have a small impact because the main function of the volatility analysis is to introduce conservatism to the trend values. The minimum of three historical values are required to perform such analysis. In addition, the peer trend assessment compares the average rate of change of the ratio value for the company over 3-4 years to the average rate of change of the median ratio value for the peer group, provided that this data is available. The collection of peer level data via the Data Consortium will be put in effective use at this level of analysis.

6.5.1.4 Absolute Assessment

For some ratios, not all, there are certain common industry standards that translate to company performing well or poorly. This assessment is included to counter the effects of making ratio comparisons in a very strong and weak industry. The absolute values used will vary across different scorecard templates provided in RiskAnalyst per

different asset classes. The benchmark fixed points for a given ratio are defined during modelling and entered in the tuning tool.

6.5.1.5 Qualitative/Judgemental Analysis

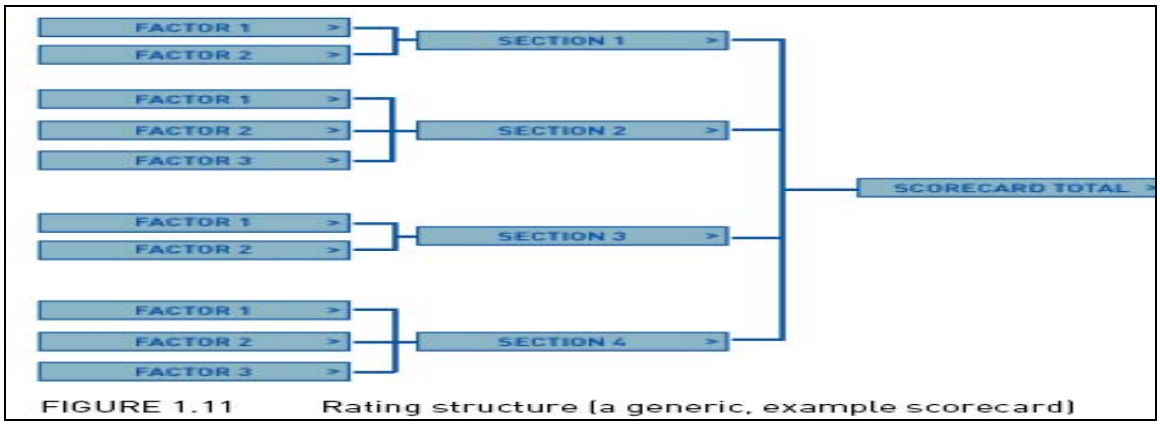
To support the need to take into account all the factors that may influence the level of risk, an effective internal rating model commonly include factors which relate to the domain and environment in which the company operates, for example: the quality of the company's management, its standing within the industry, or an assessment of the riskiness of the industry itself.

An effective rating system should balance the view of credit risk with the proper mix of objective factors (quantitative variables) and judgement (qualitative factors). Sometimes not all information can be captured by the financial statement of the borrower and rating framework heavily relying on these financial factors need to be adjusted with judgement and other subjective factors. That being said, the judgemental factors can also be a source for bias where caution needs to be practised to avoid optimism or conservatism[160]. Instead, a good rating system will reward the accuracy.

6.5.1.6 Ratings Summary

A scorecard consists of a set of factors grouped into sections corresponding to particular areas of analysis. Scorecard factors obtain data from Qualitative analysis or from Financial Ratio Analysis or other variables, such as industry, size entered in RiskAnalyst or an external program, such as EDF measures. Based on the input value the factors are scored, weighted to attribute to the overall score of the section. The section scores are weighted and summed to give a total model score. Finally, the total model score is mapped to a grade and a PD during calibration of the model. Most lending institutions have a grading scale with between 10 and 20 grades, or buckets, into which borrowers are placed. The internal rating score must be mapped, or calibrated, to this grading scale to determine the correct grade for each borrower. Some institutions allow certain users to override the final grade. RiskAnalyst supports overrides in a transparent, controlled and monitored way. Override grade are stored alongside system-generated grades, and are easily distinguishable from them.

Figure 6.7: Scorecard based rating structure

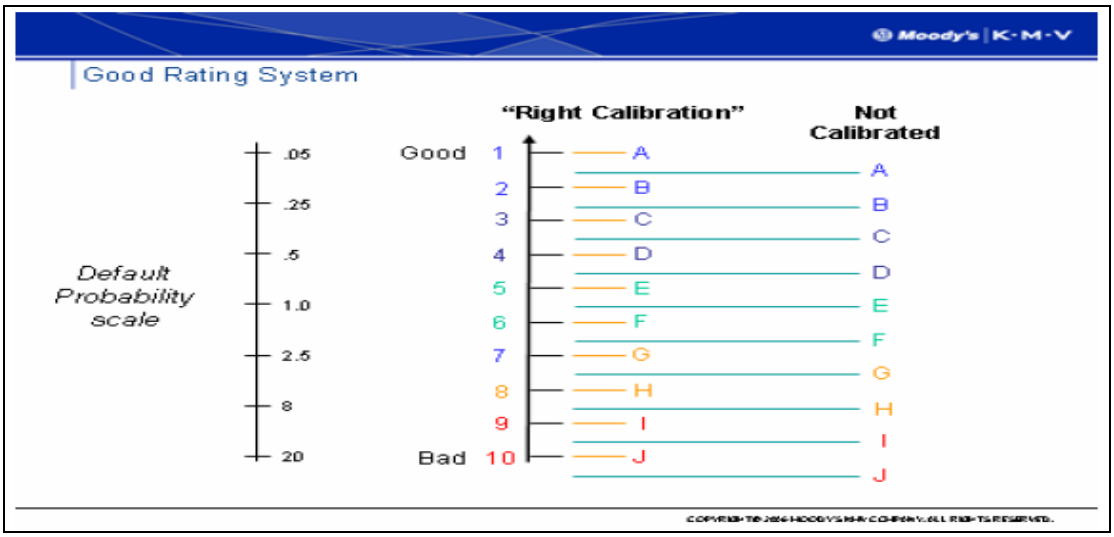


Source: Moody's KMV RiskAnalyst User Guide

160 Basel II , Requirement 3, Use of Models, Paragraph 417

Basel II requires the rating grades to be minimum 7 grades, as mentioned in sub-section 5.2.1.3 Rating Structure and Granularity of Rating Grades of Chapter 5. The thesis provided a rating scale in Chapter 5, sub-section 5.6.1.3 Obligor Rating Assignment by LPG in Table 5.1 for illustrative purposes. Once borrowers are assigned to grades, lenders need to convert their scale into an absolute measure of risk by mapping the grade to an equivalent probability of default (PD) measure[161]. This PD represents the average probability of borrowers in that grade to default within a certain time horizon, typically one year. This mapping can easily be represented within RiskAnalyst and displayed to the user alongside the borrower grade. This mapping should give the correct level of probability of default and hence *Calibration* is a key component for achieving an effective internal rating system. Right calibration better supports pricing than mere ordinal ranking of credits as illustrated below.

Figure 6.8: Key Characteristics of Good Rating Systems[162]



Source: Moody's KMV

Under Basel II 'Rating System Design', banks must document the relationship between a borrower grade and its level of risk, particularly the grade's PD and the criteria used to assign that PD. RiskAnalyst enables each bank to develop and enforce a borrower grade scale with specific definitions or categories of risk. This solution presents assessments from rating models on a continuous and relative scale that can be adjusted by the bank. Banks need to fine tune the mapping from grades to PD in order to avoid concentrations of borrowers in any risk grade[163]. Basel II also states that the excessive concentrations in risk grades to be avoided in the same paragraph. It is also very useful to compare this internally-derived PD with a default estimate produced by an externally validated model such as the EDF, and this can be displayed in RiskAnalyst as a benchmark. In Phase 4, the uses of benchmark models will be elaborated.

161 Basel II , Requirement 7, Paragraph 447, 461-467

162 Brammer, M, Moody's KMV, "Five Characteristics of a Good Internal Risk Rating System", CreditRisk.net, p.2

163 Basel II , Rating System Design, Paragraph 403: "A Bank must have a meaningful distribution of exposures across grades with no excessive concentrations, on both its borrower-rating and its facility-rating scales".

Under Basel II 'Rating System Design'[164], banks must take all relevant, available information into account when assigning ratings to borrowers and facilities, which is also marked as one of the key issues when laying the organizational foundations of an IRB implementation in Chapter 5, sub-section 5.2.1.1, Rating Systems and Approaches to Rating Assignment. Information must be current. An external rating can be the primary factor determining an internal rating, but the bank must consider other relevant information. Respectively, RiskAnalyst can combine financial statement information and associated performance ratios with judgemental factors not found in financial reports. The update of these factors can be done as frequently as possible to get a current assessment. Banks can deploy risk rating models that incorporate external ratings and other risk metrics, such as EDF estimates in combination with additional information on the borrower to create a 'composite' risk rating. Furthermore, banks must meet the disclosure requirements of Pillar 3 to qualify for IRB. In that respect, extensive online and written documentation, explanation facilities, and portfolio reporting capabilities are available in RiskAnalyst to support bank's internal disclosure effort, which GRM for credit risks and RMW will mainly be responsible as discussed in Chapter 5, sub-sections 5.4 and 5.5. A good internal rating system distributes insights across the organization, which involves a standardized and consistent framework for documenting the rating methodologies, which makes the rating process more efficient, but also allows everyone a better understanding of the actual risk presented by the borrower. In particular, the ICAAP should ensure with the use tests that the bank's organizational framework will support this goal. Please see Chapter 3, sub-section 3.4.3.3.

Once analysis is completed, Archive module is used to create a record of that analysis. Archive Module stores and retrieves records of analyses for purposes to support internal audit functions, but more importantly to provide historical records of analyses for model development and validation purposes. The archive module will help the credit review function, as stated by Basel II 'Corporate Governance and Oversight requirements, to review the design, implementation and performance of the models on an ongoing basis[165]. A good rating system should record the historical financial and judgemental factors per each borrower for performance tracking and this data archive becomes the primary source of validation and calibration needed to maintain the accuracy and effectiveness of the internal rating system. The importance of validation framework was highlighted repeatedly in Chapter 3, sub-section 3.4.3.3 as part of ICAAP and the responsibilities of the GRM for credit risks in Chapter 5, sub-section 5.4.5.3. On borrower level all account-related information and judgemental evaluations are stored and linked with facility-related data, which allows consistent tracking. At the portfolio-level there is a comprehensive reporting functionality on the portfolio quality, historical trend assessments as well as identifying exposures across the risk-rating curve. Indeed, such activities form the key responsibilities of the LPMG and offered as part of portfolio strategy and planning in Chapter 5, sub-section 5.6.2 and in the organization of LPMG depicted in Figure 5.5. With reference to Basel II 'Risk Rating System Operations' requirements, RiskAnalyst provides explanation reports combined with an intuitive analysis structure facilitating an understanding of the derivation of assessments via electronic case files and summary reports[166]. Banks can set and store

164 Basel II , Requirement 3, Paragraph 397

165 Basel II , Requirement 5, Paragraph 441

166 Basel II , Requirement 4, Paragraph 422, 424, 425 and 428

guidelines to revise and override the risk assessment. Banks can also set up and run stress-tests on a portfolio by utilizing data captured by and rating models deployed in the system. It also allows for projections forward under different scenarios that can facilitate the analysis of each borrower under stressed conditions[167]. Custom scorecards can be created by RiskAnalyst Tuner, which helps to edit and delete existing models, and manage ratio assessments.

6.5.2 Facility Analysis

Facility Analysis deals primarily with the question of "*In the event of a default, how much do we expect to lose?"* while the Borrower Rating asks the following question**:** *"What is the likelihood that the borrower will default on an obligation?"*

The answer to the first question is driven by seniority, the quality of collateral, and guarantees, whereas the answer to the default likelihood is primarily driven by financials and non-financial information of the obligors. For banks adopting the IRB approach, Basel II advises that facility ratings must exclusively reflect LGD. This assessment can include any and all aspects that impact the value of a facility. According to this, RiskAnalyst Facility module's LGD ratings assess the relative riskiness of a facility based on both financial and non-financial aspects as well as aspects associated with collateral and guarantees. This allows for a more comprehensive review of the recovery risk associated with the transaction.

For each facility, RiskAnalyst calculates an Exposure at Default (EAD), which is an estimate of the outstanding amount on the facility should the borrower default. Then, the solution considers recoveries that could be obtained if the default event occurs. The expected recovery can be improved by using Credit Risk Mitigants (CRMs) to enhance the quality of the obligation. The CRMs commonly are the guarantees and collateral (collateral consists of charge on a borrower's asset by the creditor).

RiskAnalyst implicitly adjusts the exposure by segmenting it into portions covered by different collateral and guarantee types with any remaining exposure left as unsecured. It captures detailed information about each item of collateral and automatically applies the eligibility criteria to determine the appropriate haircut. By default, RiskAnalyst applies the Basel II Foundation IRB approach's LGD requirements. If the bank applies the A-IRB approach, the collateral factors, eligibility criteria, haircuts together with adjustments for lending type and revaluation criteria, can be amended with internal estimates[168].

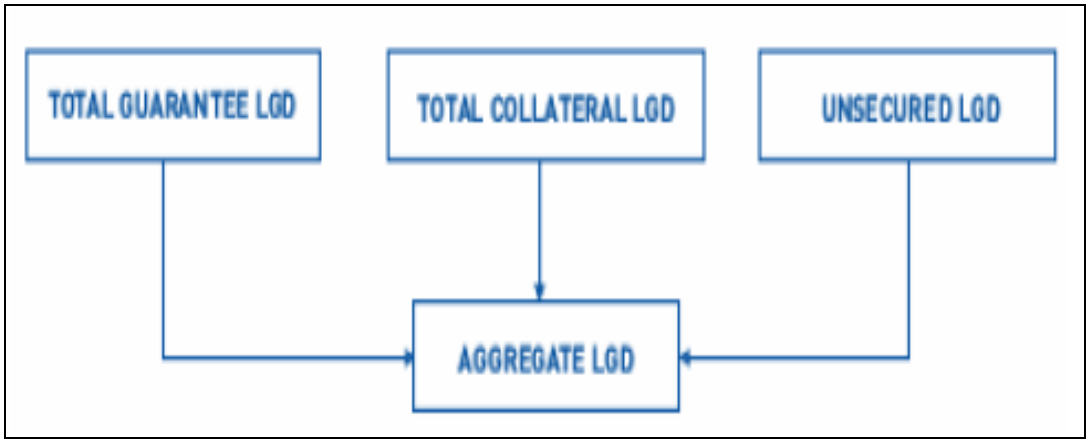
Expected Loss (EL) is the expected value of losses due to default. To assist validation and management on borrower level, solution aggregates EL and LGD per borrower by summing the LGD and EL amounts for each facility. To derive the LGD per facility, the solution breaks up EAD into 3 parts: guaranteed, collateralized and unsecured. LGD per each part is computed separately. EL is calculated in a similar way and then summed to get the aggregated values. Refer to the LGD and EL Aggregation below.

167 Basel II, Requirement 4, Paragraph 434-436.

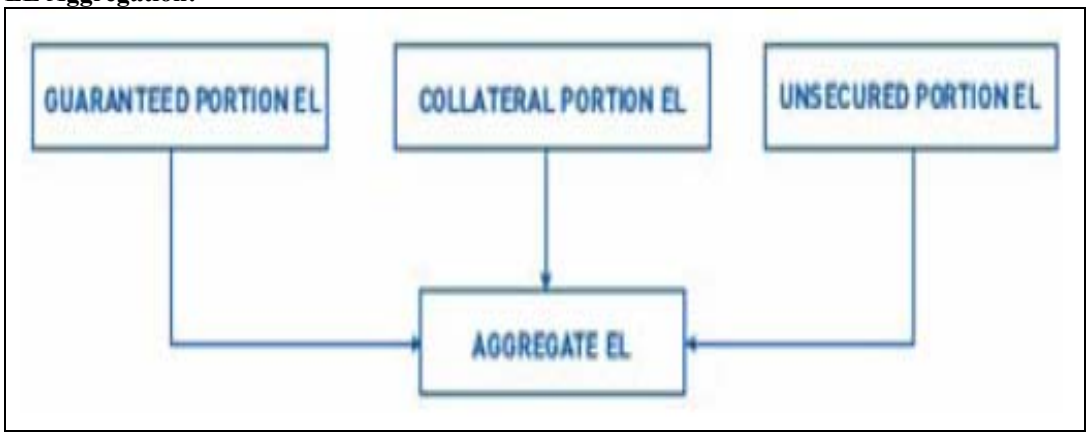
168 Basel II, Paragraph 431

Figure 6.9: LGD, EL Aggregation and Calculation Graphics

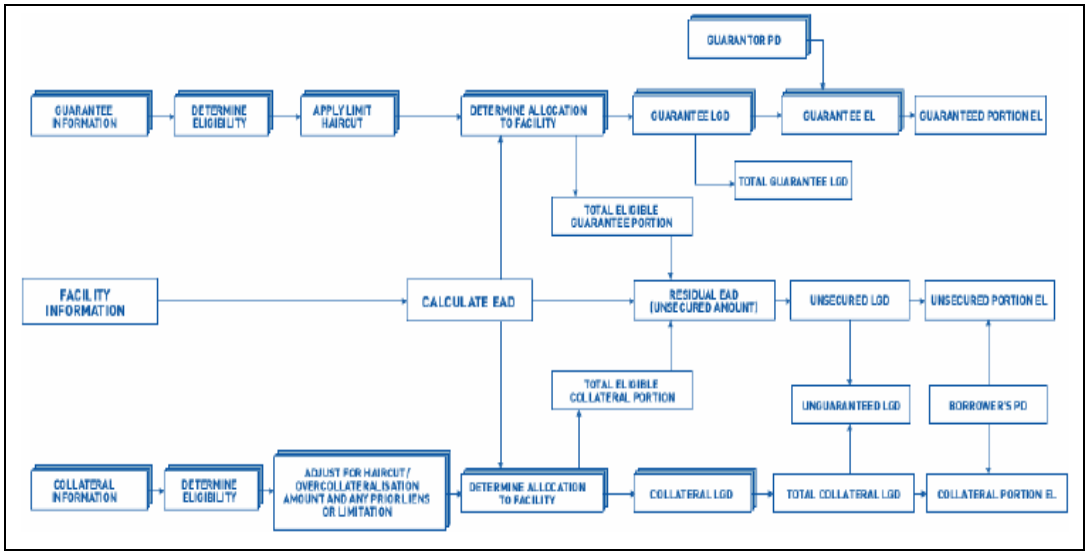
LGD:



EL Aggregation:



Overview of Calculations:



Source: Moody's KMV RiskAnalyst Facility Module Guide

6.5.2.1 EAD Calculation

Once the utilization, commitment and the Credit Conversion Factor (CCF)[169] are specified by the bank as inputs, for both used and unused portion of the facility, EAD can be determined. CCFs are simply the numbers to convert off-balance sheet items into credit equivalents by recognizing the inherent risk in various types of items. If these items are not provided, then the bank needs to specify the EAD value. Alternatively, RiskAnalyst's reference CCF values by facility type, original maturity and whether the facility is immediately cancellable are also available. RiskAnalyst applies the Basel II F-IRB's EAD approach by default. The only data requirement for the bank will be the commitment and utilization. Under A-IRB's EAD approach, banks will be allowed to use their own estimates of CCFs. Accordingly; RiskAnalyst allows banks to change CCFs and adjustment parameters as well as the facility types and other drivers that determine the CCFs.

6.5.2.2 Treatment of Guarantees

By default, RiskAnalyst considers guarantees first (before collateral), as specified in Basel II. The system sorts each facility's guarantees first by their PD and second according to their LGD. There are complex rules governing which guarantees are eligible in Basel II and hence RiskAnalyst uses a set of eligibility criteria for guarantees, by default[170]. User can customize and/or extend on these default values. Haircuts are applied to a CRM to account for the risk of fall in value of CRM held due to default or during the close-out period. RiskAnalyst comes with haircuts for guarantees with values of zero, but users can customize this via entering the true expected realization of the guarantee.

6.5.2.3 Treatment of Collateral

RiskAnalyst provides a mapping from its own collateral types to Basel II equivalents. Under Basel II F-IRB's LGD approach[171], there are four types of collateral, which are recognized: Financial collateral, Receivables, Commercial and residential real estate (CRE/RRE) and Other Collateral. RiskAnalyst supports the distinction between eligible and ineligible where ineligible collateral is automatically removed from the calculations.

Regarding Haircuts and Eligibility Criteria, RiskAnalyst uses a table for specifying the base haircuts for financial collateral as taken from Basel II F-IRB approach. These haircuts are based on the assumption of daily mark-to-market, daily remargining and 10 business day holding period. Basel II also states that for secured lending, a minimum 20 days is appropriate and provides formulae for transforming the haircuts. RiskAnalyst uses Basel II F-IRB formulae to transform the supervisory haircuts[172]. For non-financial collateral, Basel II F-IRB specifies an over collateralization[173], which are

169 Basel II, Paragraphs 311-314.

170 Basel II, Requirement Paragraph 140-142, 195, 302-305

171 Basel II , Paragraph 287-290

172 Basel II, Paragraph 166-169

173 Basel II, Paragraph 295-296

transformed to haircuts using haircut=1/ (1-overcollateralization level). RiskAnalyst then uses these as the haircuts for non-financial collateral.

After all haircuts are applied, RiskAnalyst deducts any prior liens and then caps the collateral valuation to the value of the limitation.

Under Basel II F-IRB, a minimum collateralization level[174] is specified for certain collateral types, e.g. CRE/RRE and Other Collateral. RiskAnalyst provides a table to specify such minimum collateralization levels as defined by Basel II to ensure there is significant coverage of the exposure. RiskAnalyst checks if the collateral has met the Minimum Collateralization Level through a series of calculations. Finally, RiskAnalyst will ignore collateral where the collateral LGD% is greater than the unsecured LGD% for the facility. Minimum %LGD levels are provided to a particular collateral type using best industry practices. These levels can be overridden by the bank with its own estimates. In general, solution allows all parameters to be configurable. Therefore, they may be amended to fit bank's own estimates, provided that supervisors permit banks to calculate haircuts using their own estimates as advised under Basel II F-IRB[175].

The appropriate haircut for each asset to determine the portion of the exposure covered by the asset is applied automatically. Summing these portions determines the value of the basket after the weighted average haircut is applied[176].

6.5.2.4 Allocating Credit Risk Mitigants (CRMs) to Facilities

In practice, it is common for complex relationships to exist between facilities and CRMs. To handle this, RiskAnalyst uses both algorithmic and user-specified approaches. Users can allocate CRMs for facilities automatically or manually by defining percentage of CRM to each facility. If users do not manually define this relationship, then RiskAnalyst uses an algorithm based on EAD weighting to apportion the CRMs.

In the *automatic allocation,* it determines the facilities to which guarantee is allocated via finding the total EAD of facilities and then assigning a weighting based on the facility EAD/total EAD of facilities. Then, the guarantee allocation is determined by the weighting and the guarantee value. Having allocated guarantees, RiskAnalyst then allocates collateral similarly using the residual EAD that is after deducting the guarantee allocations.

The *manual approach* can be used when a certain CRM is known to be tied to a specific facility. In best practice, this runs the danger of over-allocation of CRM to one facility while leaving other facilities only partially covered.

Having determined the allocation for an individual guarantee, RiskAnalyst multiplies this by the guarantor's LGD to calculate the LGD Amount. EL is simply the product of LGD Amount and the guarantor's PD. For corporate guarantees[177], it ensures that the

174 Basel II, Paragraph 295-296

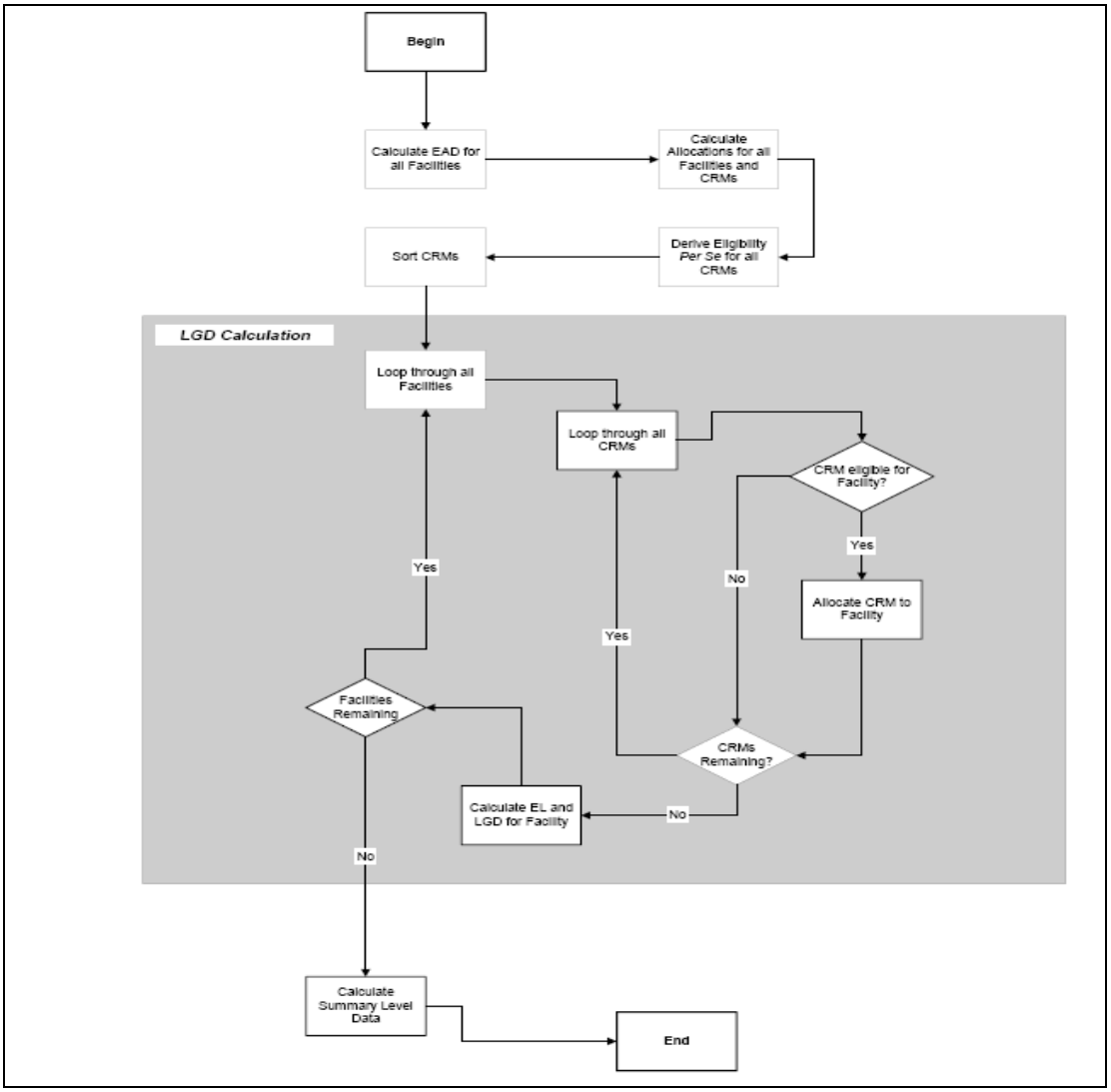
175 Basel II, Paragraph 154

176 Basel II, Paragraph 150

177 Basel II, Paragraph 302-305

guarantor PD is at least 0.09% (equivalent to A-). This value is configurable by the bank based on guarantor type. In addition, it compares the guarantor's PD and LGD to those of the borrower to determine eligibility, as stated in Basel II F-IRB approach. Having considered guarantees, RiskAnalyst considers collateral allocations as discussed above. RiskAnalyst then multiplies this by borrower's LGD to calculate LGD Amount. EL is the product of LGD Amount and borrower PD. PD used in the LGD module can come from either the 1-year EDF measure or the PD derived from the scorecard total or grade in the Borrower module. If any of the exposure is still left uncovered after applying all guarantees and collateral, RiskAnalyst considers this unsecured and uses unsecured LGD% to determine an unsecured LGD Amount. Based on the seniority, the LGD% is determined for the unsecured portion of the facility, in accordance with Basel II, which determines the LGD% of unsecured claims 45% for senior and 75% for subordinated. EL is then calculated as the product of LGD Amount and the borrower PD[178]. The sophisticated automation is illustrated below.

Figure 6.10: LGD Calculation Algorithm



Source: Moody's KMV RiskAnalyst 'Facility Module'

178 Basel II, Paragraph 287-290

In summary, solution is designed to meet the requirements in the Foundation IRB for LGD. The solution can be customized to meet the advanced LGD framework by the bank, but Turkish banks have scarce data around the loan loss and recovery that makes the application of A-IRB difficult. However, proper capture of this data within a consistent platform such as RiskAnalyst can assist with the future development. For illustrative purposes, the thesis gave an example of Facility rating process in Chapter 5, 5.6.1.4, determining the Facility Rating (LGD) and the Exposure at Default (EAD). Moody's KMV LossCalc follows a more econometric, statistical analysis of the LGD, which may also assist in benchmarking internal LGD models. The thesis will discuss LossCalc model as part of the A-IRB roadmap in Phase 8.

6.6 Phase 4: Probability of Default (PD) Models

6.6.1 Time Horizon

As indicated in Basel II, there may be many purposes of an internal model ranging from credit approval/renewal, loan structuring, credit monitoring on borrower and portfolio level, limit system, economic and regulatory capital, loss calculation to pricing[179]. There are several rating model types called "Point in Time and Through the Cycle" Ratings to start with PD Modelling[180] as some considerations were also outlined in Chapter 5, 5.2.1.5 Rating Assignment Horizon.

Table 6.1: Characteristics of Point in Time (PIT) and Through the Cycle (TTC) Rating Models

Characteristics	Point in Time	Through the Cycle
Historical Background	Treacy & Carey (1998) first referenced "point-in-time" ratings in their FRB Bank Ratings Survey article	Moody's (1995) first referenced "through-the-cycle" ratings in an article about the copper industry
Behaviour	Rating fluctuates with the borrower's condition within the business cycle	Borrower rating does not fluctuate with the borrower's condition within the cycle (and changes only in response to enduring changes in credit quality)
Time Horizon	Generally 1 year	Through the credit cycle, generally > 5 years
Transition Matrix	Off diagonals are strongly populated	Stable, most of the borrowers are on the diagonal

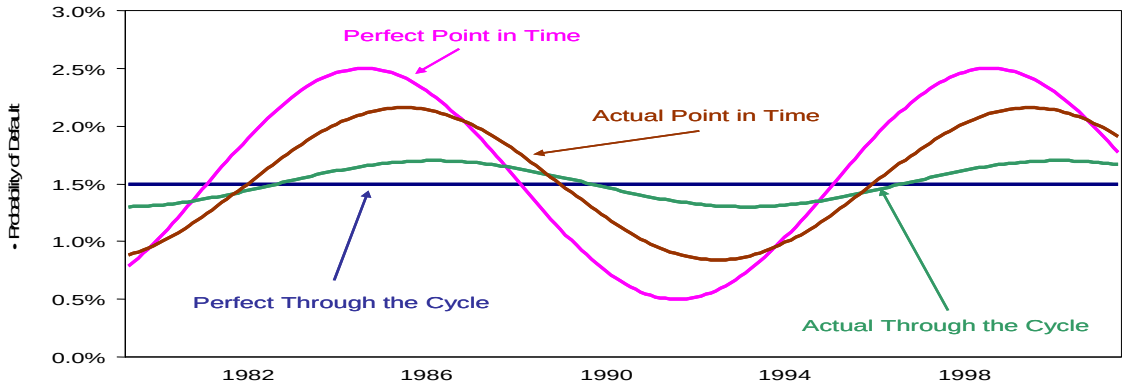
Source: Moody's KMV Modelling Services Group

179 Basel II Working Paper No.14, 'Studies on the Validation of Internal Rating Systems', Dynamics of Rating Systems, February 2005

180 Crosbie, P. /Bohn, J: Modeling Default Risk, Modeling Methodology, MKMV Modeling Papers, 2005 and Engelmann, B. / Rauhmeier, R.: The Basel II Risk Parameters, Springer Berlin, 2006. For more technical issues; Servigny A./Renault, O.: Measuring and Managing Credit Risk, Standards&Poors, 2004.

Depending on the purpose, through the cycle (TTC) or points in time (PIT) measures have both advantages and disadvantages on a practical level and hence most banks adopt a mixture of both where thesis will refer to these as hybrid models. If daily data is not available from capital markets or other sources on some borrowers, this will cause challenges for a perfect point in time rating. In the absence of sufficient historical default rates for rating classes over a cycle, this will also make it difficult for a perfect through the cycle rating[181].

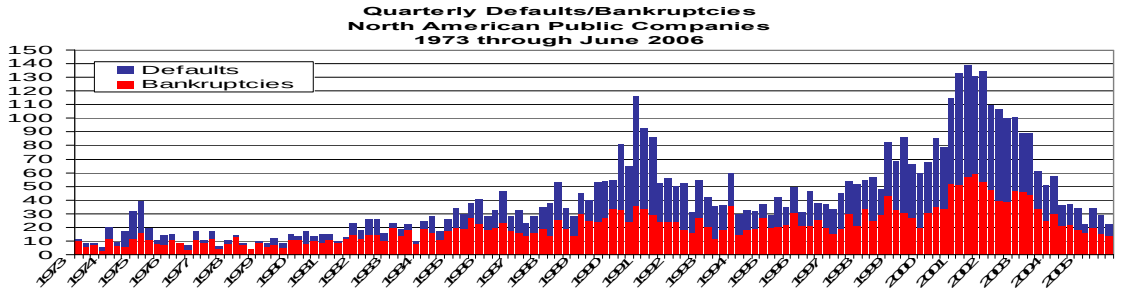
Figure 6.11: Actual Rating and Perfect Rating



Source: Moody's KMV

According to the recent studies on validation, the assumption that the average default rate is stable over the time is not yet proven and threatens the feasibility of a perfect through the cycle rating[182]. Similarly, daily changing ratings in a perfect point in time measure can be unsuitable for business decisions from a relationship banker's point of view with regards to longer dated instruments. *The appropriate approach can differ from portfolio to portfolio and the asset type*. Some aspects banks need to take into consideration can be expanded from the ones outlined in the sub-section 5.2.1.5 of Chapter 5 when building their internal PD models. In general, there are two components to credit risk: *Systemic and Idiosyncratic risks*. Systemic risks are associated with economic conditions, the extent of exposure to the local and global economy. Mostly, bigger the company more exposure it has to the systemic portion of the risk. As experienced by large Turkish corporations and financial institutions, there is very little degree of isolation to global credit market turmoil and credit cycle becomes a reality.

Figure 6.12: Public Default Database Statistics 1973-2006



Source: Moody's KMV Default Databases

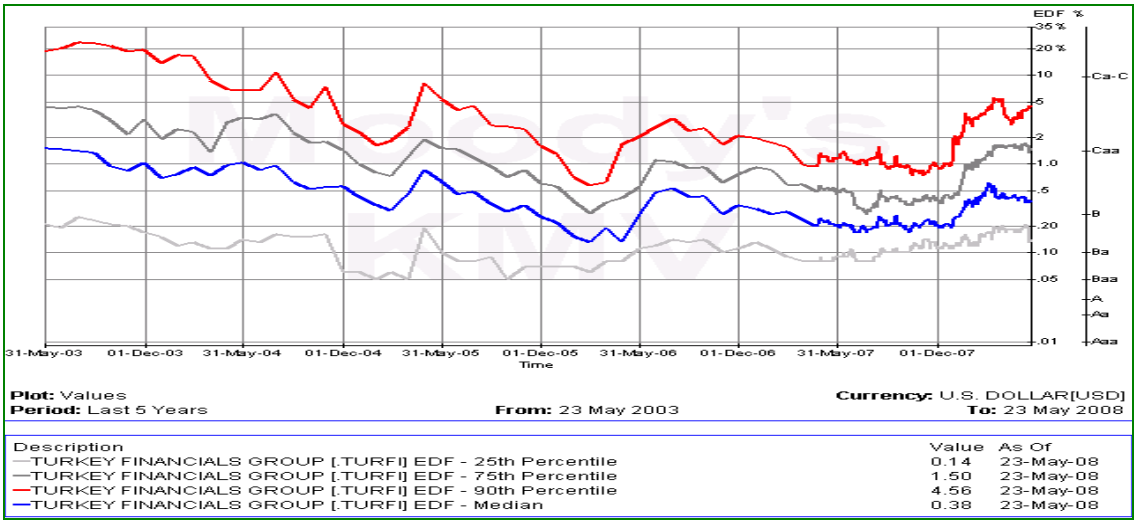
181 For details of PIT and TTC, refer to: The Basel Handbook (2007, pp.267-297). Designing and Implementing a Basel II Compliant PIT-TTC Ratings Framework.

182 Basel II, Working Paper No.14, Studies on the Validation of Internal Rating, Dynamics of Rating Systems, February 2005.

Looking at the default and bankruptcy data above (Figure 6.12, for North American Public Firms as an example), there has been a recession in 2001-2002 credit markets followed by a transition period in 2003 and a boom from 2004 to 2006.

Banks in most economies including in Turkey responds to cyclical changes and tend to tighten their lending policy, during recessions like in late 1980s and early 1990s and more recently in 2000-2002. This results in liquidity shortage and reduced bank funding leads to additional defaults of companies which are highly dependent on additional liquidity. As correctly pointed out by Michael Gordy, *"Even if you feel you need to stabilize economic capital, it would be a mistake to stabilize the inputs. The inputs to capital need to reflect all the available information, including the current environment"*[183].

Figure 6.13: Expected Default Frequency of Turkish Financial Services Industry



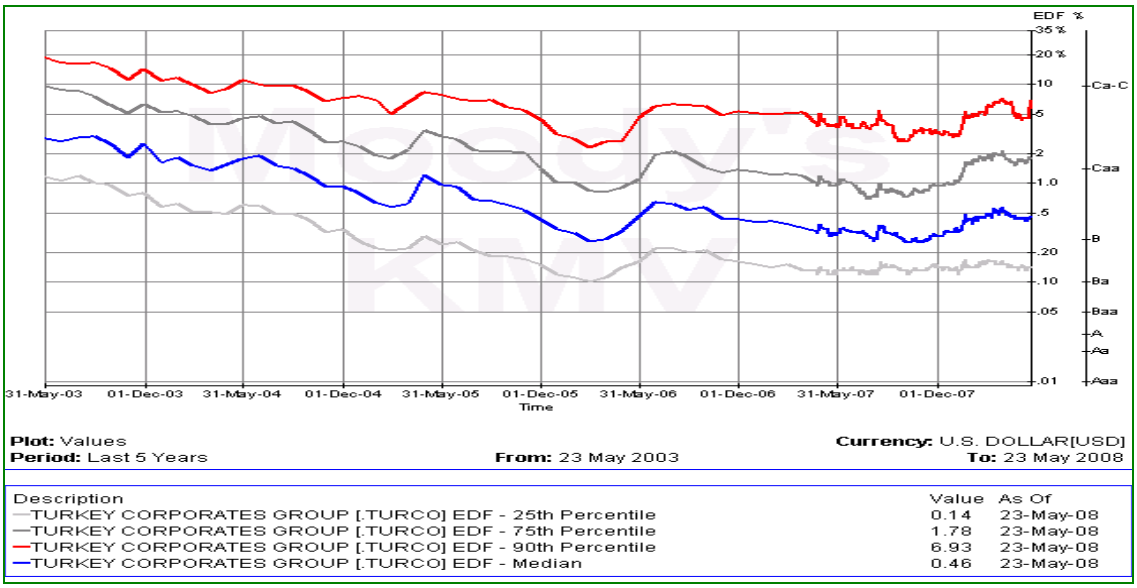
Source: Moody's KMV CreditEdge

To reveal the volatility in Turkey, 1 year default probability, EDF data in Figure 6.13 as taken from the Moody's KMV for Turkish Financial Institutions group reflects the current situation and provides a historical EDF values on peer level in the above chart. In early 2003, peer/aggregate level EDF percentiles (default probabilities) are very high reflecting the recessionary point in the cycle. As the global trend and cycle improves towards 2005, EDF measures improve significantly. Staring in mid-2006 stretching to end-2007, one can observe that credit quality started to deteriorate immensely for the financial peer group predictive of the volatility and liquidity problems experienced in the global markets today. Turkey being a country in large foreign debt leads to the increase of vulnerability of its financial institutions to the global credit and liquidity turmoil. It is worth stressing that, credit cycles are a reality and more so for local banks of countries in large foreign debt, such as Turkey. As liquidity of the Turkish banks are threatened with global liquidity squeeze, one can clearly observe the severity of the impact, this has caused on its large corporations in the below chart. For financial institutions and large corporations, which are highly exposed to the systemic risks, more PIT measures will provide predictive and early warning signals to take timely and forward-looking decisions. This flows well with the requirements of Basel II on the stressed PDs for the downside risk (see in sub-section 5.2.1.5 Rating Assignment

183 Federal Reserve, at the NYU/MCO Inaugural Credit Conference, May 2004

Horizon of Chapter 5), which should capture the credit cycle changes and forward-looking in nature.

Figure 6.14: Expected Default Frequency of Turkish Industrial Companies



Source: Moody's KMV CreditEdge

When default rates drop, banks cannot underwrite loans based on a through-the-cycle average cost of funds and they can not ignore prepayment risk when rates fall. From a pricing perspective, banks need to measure Return-on-Risk and hence appropriate PIT measures should be in place. Finally, spreads do widen during recessions and high risk periods, where the dynamics of such credit quality changes need to be captured in a timely, precise and consistent way to charge premiums for possible losses. It is important to note also that the EDF measures offer a term structure from horizon 1 to 10 years and 5 years for publicly listed entities and private firms, respectively. Thus, the EDF analysis can be used for banks that would like to know the risks beyond 1-year horizon, which is generally advised by the Basel II accord.

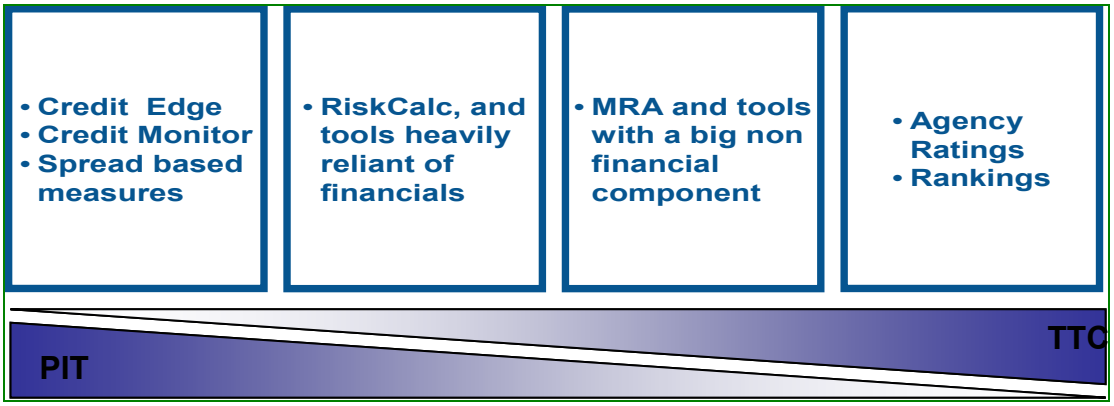
In contrast, the purpose of the Agency ratings is to provide credit quality assessment of borrower over the long term. This type of TTC measures generally rank order all borrowers according to their overall long term credit risk and group the outcome of the ordinal scale into classes. Then, they use observations of the default behaviour of each class over the long term and assign the average yearly default rate to each rating class. The time horizon is generally over 5 years.

Stable ratings result in stable expected loss and capital measures where provisions can be linked to Expected Losses. If losses are defined as average through the cycle, this would mean a stable provisioning system. Therefore, in good years, banks are saving for the bad years. In other words, in good years banks are not so inclined to go through a lending frenzy, the consequences of which will be felt when the boom is over. In general, this should reflect on a stable balance sheet for the institution, however, in reality, banks business strategies evolve with competition and as risk appetite varies across time, which make stability unlikely to be achieved on a long-term basis.[184]

184 Basel II Working Paper No.14, 'Studies on the Validation of Internal Rating Systems', Dynamics of Rating Systems

The choice of the model is also dependent of the asset type. For example, risk drivers of SMEs are not very cyclical (huge portion of risk is idiosyncratic). Idiosyncratic risk is driven by factors specific to the company, e.g. management failure, fraud, etc and independent from systemic developments. Additionally, qualitative overlay includes the forward looking element of the rating and the calibration can be based on a long term average default rate (if possible through the cycle) for these types of credit. Depending on the asset type, the internal models may incorporate more than one model, with hybrid approaches between PIT and TTC. There are various approaches available to fit the business objectives, credit culture and portfolio composition of the bank. An example diagram is outlined below.

Figure 6.15: Should We do PIT or TTC?



Source: Moody's KMV Modelling Services

Upon analysis of the industry / segment structure of the bank's portfolio in Phase 2, both in terms of performing and defaulted obligors, the segments in the bank's portfolio that support quantitative PD models based on statistical analysis can be determined. The key to this issue is the number of defaults available to support PD modeling. Banks need first to review the gathered data and to see what models would be most appropriate to build. The bank must reach a balance between the granularities of model segmentation (i.e. number of models) vs. the available data. Building too many models when there may not be enough data (or exposure in the bank's portfolio) is not generally justified. However, too few models may inadequately capture the risk characteristics of varying exposures. If the bank has an especially high concentration in some particular industry and there are enough defaults, they should opt to construct a model specifically for that sector since it is important to the bank's business. Assuming that the data has been extensively cleaned, banks can perform the appropriate univariate mini-modeling of risk factors (drawn from a list of financial ratios). Then they will construct a model that performs well within a multivariate transformation. These steps are indeed similar to the approach used in the RiskCalc EDF models[185], which are detailed under sub-section 6.6.2, 'External quantitative default probability models'. Once the final model has been specified, banks need to validate and calibrate the model. In all cases, banks need to make sure that the risk factors that are chosen make sense in the local context, and that they are powerful in discriminating good and bad credits as rapidly as possible. One of the important stipulations of Basel II is to provide

185 Dwyer, Kocagil, Stein , Moody's KMV RiskCalc 3.1 Model whitepaper, Section 3 Model, April 2004.

documentation on the modeling methodology, as well as validation / calibration reports. Using bank's internal data and experience, these models tend to be hybrid somewhere in the middle of TTC and PIT space.

6.6.2 External Quantitative Default Probability Models - EDF Models

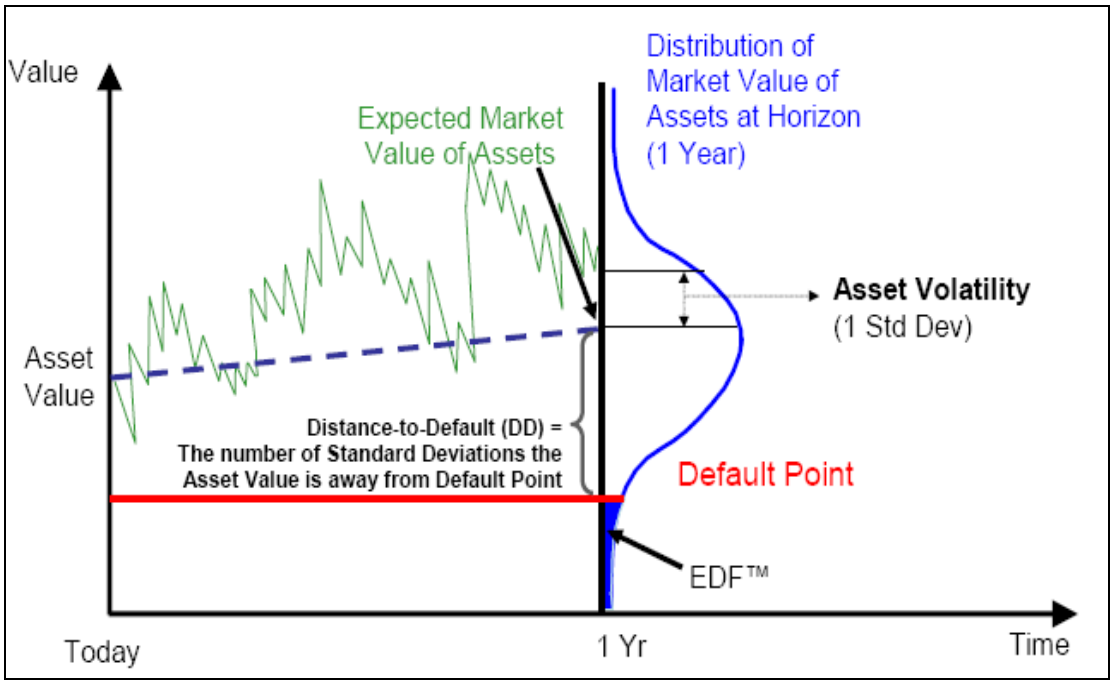
Expected Default Frequency (EDF) measures will be assessed in this section since they have been used as either benchmark or primary models and built/validated and calibrated on external (external to the bank) data. EDF measures are calculated on firm-level and are dynamic, typically the most forward looking indicator of creditworthiness.

6.6.2.1 Model for Listed Firms: CreditEdge

The default definition used is an economic one where the firm is regarded as defaulted when the *market value (not the book value)* of its assets falls below what it owes and the EDF is the probability that a firm's future market value will fall below the book value of obligations due. This is a direct estimation of default probability as opposed to ordinal ratings or ranking based on the definition of Merton Model. It is cause and effect model where the forward looking nature comes from the estimation of the market value of assets using an extension of the option-pricing framework whereby equity is a call option on the underlying assets of the firm. Given the known equity price and capital structure of the firm, EDF measure can be updated frequently and gives an early warning in credit quality of the obligor.

Unlike common misinterpretations of the EDF model, there is not any fixed weighting or over-emphasis applied to the Equity Value and its volatility. The equity portion of the asset value may have less and more impact on the EDF result given the market leverage (Default Point/Market Value of Assets) and the asset volatility.

Figure 6.16: EDF Model Summary



Source: Moody's KMV Modeling Default Risk document

EDF drivers are based on the following variables[186]:

1. Market Value of Assets (or Business Value)

Market investor' assessment of the future cash flows of the business. It is dynamic and forward looking. It is not directly observable but implied from the market value of equity and liabilities due at an event of default.

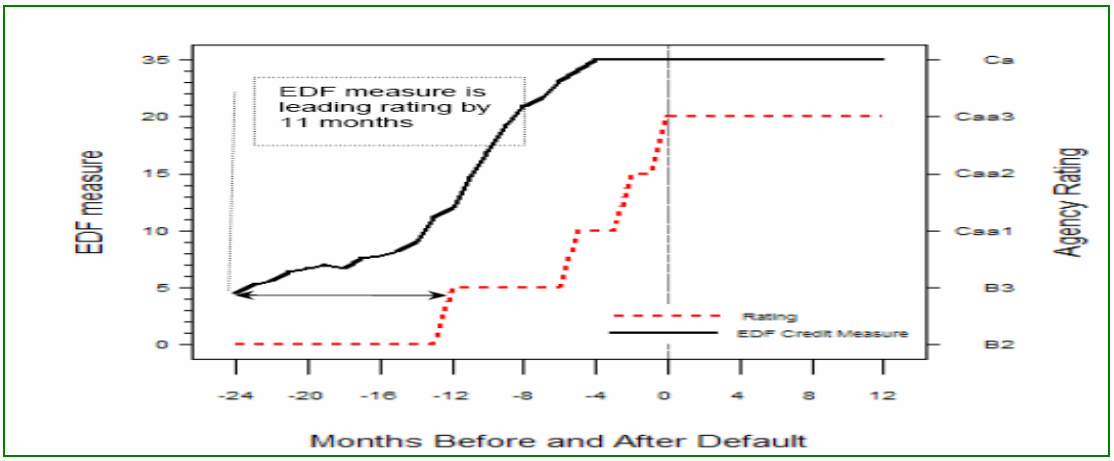
2. Asset Volatility (or Business Risk)

It is a measure of the variability in the firm's future market asset value. Business risk is estimated empirically and calibrated to industry, size and country firm belongs to. It is not the equity volatility and hence is an estimate to capture the variability of both equity and liabilities of the firm.

3. Default Point

It is a measure of liabilities due at event of default, i.e. the absorbing default barrier. This is an extensive empirical research, and function of the liabilities reported by the company. Generally corresponds to total short-term liabilities plus half of long-term liabilities for an industrial firm.

Figure 6.17: Comparison of EDF and Agency Rating



Source: Moody's KMV 'Power and Level Validation of EDF Measure'[187]

A measure of the default risk of a firm that combines the 3 drivers is the Distance to Default[188], i.e. how far the firm is away from default at a given time horizon. It is the number of standard deviations (variability) the Market Value of Assets, is above the Default Point. In other words, it is the market leverage scaled by the asset volatility of

186 Crosbie and Bohn, Moody's KMV, 'Modeling Default Risk' whitepaper, Section 3, Measuring Default probability: A Practical Approach, subsection 3.1, December 2003.

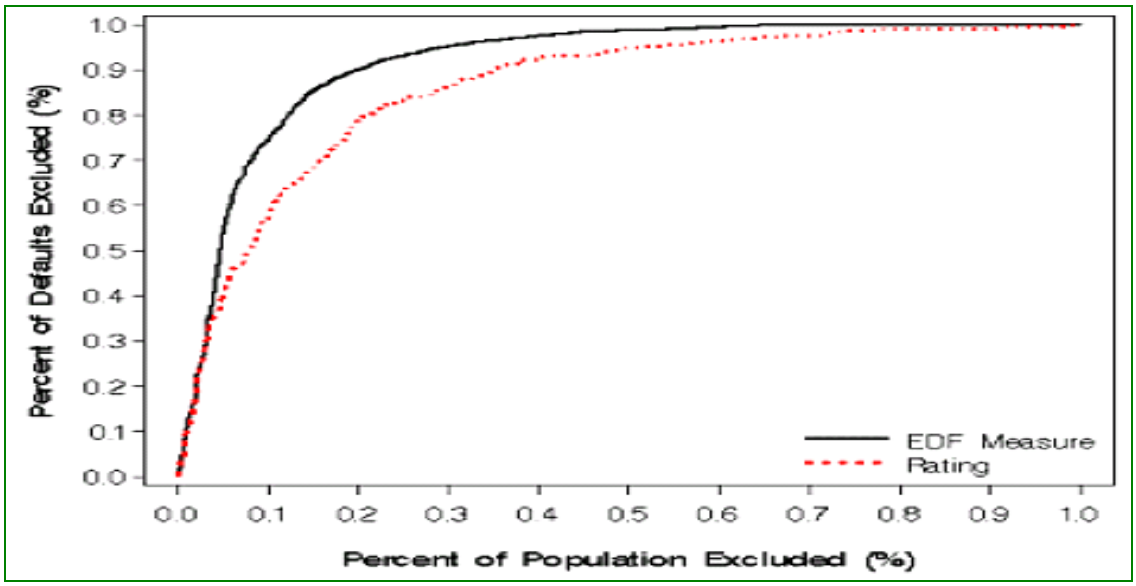
187 Dwyer, Moody's KMV 'Power and Level Validation of EDF Measure' whitepaper, 2007.

188 Crosbie and Bohn, Moody's KMV, 'Modeling Default Risk' whitepaper, Section 3, Measuring Default probability: A Practical Approach, subsection 3.2, December 2003

the firm. The DD buckets are mapped to EDF measures using an empirical distribution using the database of actual defaults going back 33 years and thousands of realized default information. This is where the EDF model sources its power – the fact that it has been validated and calibrated on 33 years of default data. Its predictive and forward looking nature comes from the ability to combine the available equity market data with capital structure of 49,000 firms worldwide. It has been used as an early warning tool across banks worldwide. Accounting based measures deliver "jump-to-default" surprises, as most of the deterioration is picked up in the last 4 months before default. Looking at the figure below, the EDF measure predicts default on average more 8-11months ahead of the agency rating and does not suffer from sudden jumps to default.

Also, looking at the power curve below, Moody's | KMV(MKMV) EDF measures do a better job of sorting more and less risky firms than do agency ratings at a 1-year horizon. This is true at all horizons up to 5 years, at which point the accuracy of the two is indistinguishable.

Figure 6.18: Comparison of EDF and Agency Rating on the Basis of Power Curve



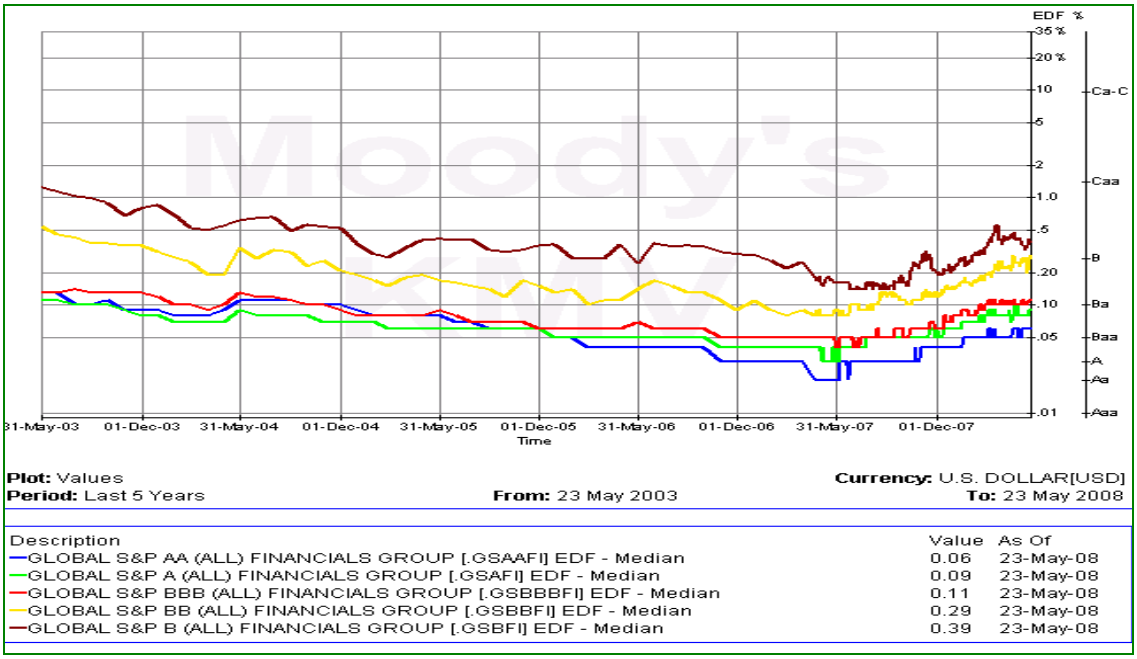
Source: Moody's KMV Research Group

EDF measures are inherently more dynamic and absolute measures of risk. Most of the time, they are regarded as PIT measure, however, if implemented appropriately, banks can achieve more TTC measure of risk using EDFs as well.

CreditEdge calculates the median EDF for firms within each agency rating bucket for each month. For example, for the current month, the EDFs of all firms in a BBB rated bucket are taken and the median EDF value is calculated, i.e. the "spot EDF-implied rating". Then, MKMV calculates the EDF medians per rating bucket for preceding 59 months, until the 60 median observations are obtained. The median of 60 observations becomes the "5-year EDF-implied rating". Both spot and 5-year median are available per rating bucket, which provides an approximate guideline as to the credit quality of companies within each rating grade. Below is an example from the CreditEdge system for a peer group. Please see below the trend for each rating bucket and their implied EDF values. 2003 refers to after the recession, 2004 to transition period and 2005 expansion in the economy and markets where EDF median for each bucket is higher,

lower and lowest, respectively. Only recently in 2007, the EDF medians have started deteriorating, i.e. turning of the credit cycle is apparent. The question is how this valuable information can be put in use in terms of implementation is concerned.

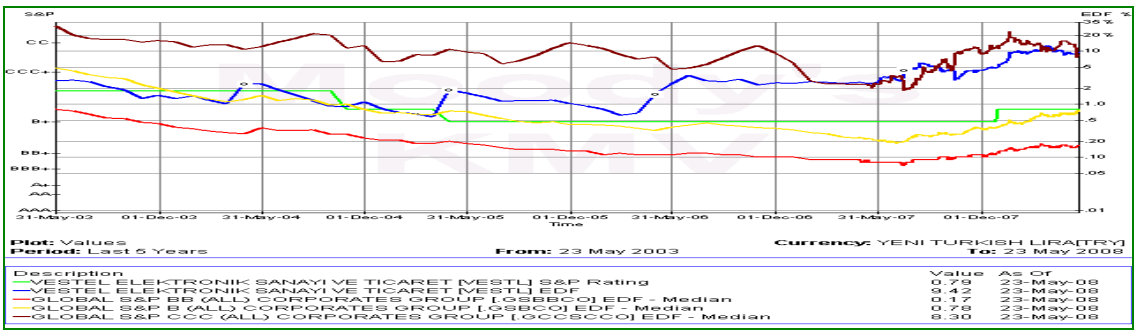
Figure 6.19: EDF Data of Global Financials across Different Rating Classes



Source: Moody's KMV CreditEdge

In general, when banks look at their default history to get a long-run average default rate for each grade, they discover that their data is insufficient to even estimate a TTC 1-year PD estimate. As a result, for each grade, they find a similar agency rating grade and get the *long-run average default rate* or a long-run EDF measure for the grade. Then, they fix the boundaries of each grade and would not adjust them as they go through the credit cycle. The problem is that fixed long-term bands lead the practitioner see lots of up/downgrade signals from market data. The nature of credit risk is that there are clearly lower and higher default rate periods, where default rates for these rating bands will vary over time. Hence, flexible EDF to rating mappings avoid frequent grade changes as they are updated on a monthly, quarterly, semi-annually, etc and allow the ratings, in many asset classes, to incorporate forward looking data from a variety of markets, e.g. both debt and equity. For example, Vestel (a Turkish electronics firm) rated as B+ by S&P (till December, 2007) has shown significant deterioration in the past year as below.

Figure 6.20: EDF Data of Vestel Electronics in Turkey



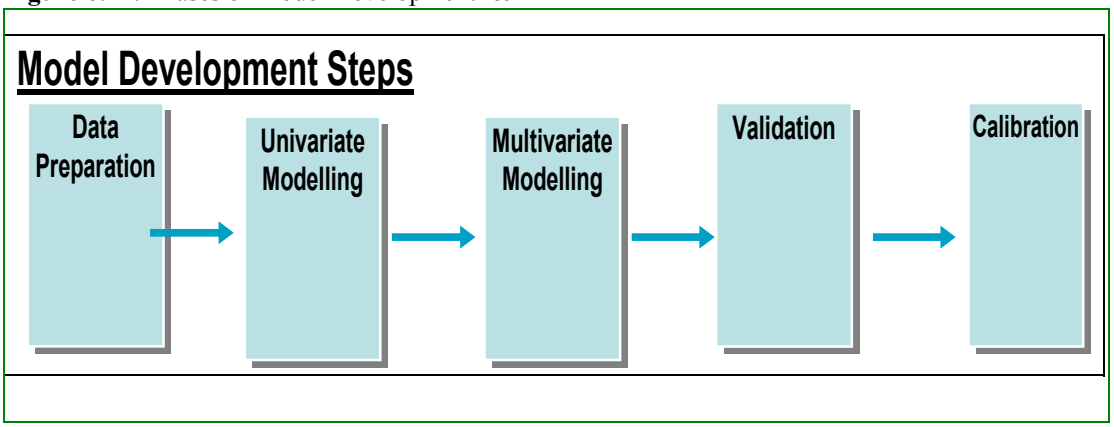
Source: Moody's KMV CreditEdge

Until March 2005, Vestel's EDF and Rating followed similar trend as the Global B (All) EDF median, i.e. stable outlook because the firm is performing as an average B rated firm. After this date, firm's EDF started to increase and became much riskier in mid-2006 and onwards, looking more like a CCC rated firm. As the firm's EDF moved away from the B-rated peer, it became an outlier and bank's systems must review this firm. Surprisingly, S&P rating stayed unchanged till December 2007, not picking up on the peer's performance versus firm's EDF. Certainly, this is just an example to highlight the uses of EDF measures in the context of rating systems for early warning signals and internal upgrade/downgrade actions. The quantitative analysis should be backed up by the relationship value and other non-quantitative factors that may justify the credit limits and the bank's internal assessment.

6.6.2.2 Models for Private Firms (RiskCalc country models)

Given good prior knowledge about relationships and good data, statistical methods provide an ideal way to incorporate modelling expertise, quantitative information and or market factors. In general, statistical models such as RiskCalc models as well as internal quantitative default probability models mentioned earlier are widely used to estimate private firms (firms with unlisted equity) credit risk where market information is missing.

Figure 6.21: Phases of Model Development189



Source: Moody's KMV Modeling Services Group

Statistical procedures used to derive relationships between default events and financial figures. They also characterize credit risk by country, industry, size and/or sector, however, require large sample of financial statement and default to develop such models: development sample and validation sample.

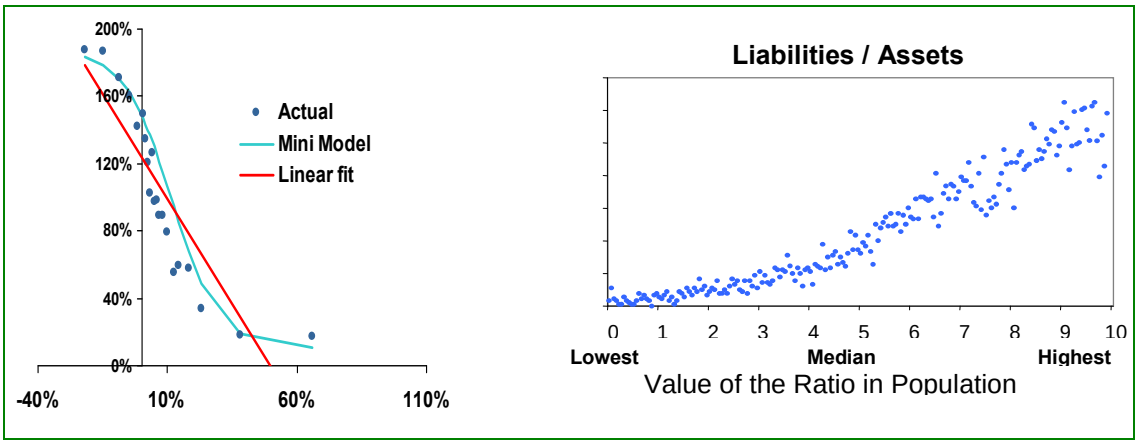
1. **Data preparation**:
The data preparation and requirements has been discussed in Phase 2 of the implementation project, and will not be repeated here.

2. **Univariate Modeling:**
Univariate Modeling observes how financial ratios (e.g. x-axis data points for Liabilities/Assets in below chart) correlate with default events (e.g. y-axis data points in

189 Dwyer, Kocagil, Stein, Moody's KMV RiskCalc 3.1 Model whitepaper, Section 2 - Product, 3 – Model, April 2004.

below chart), and then fit a relationship to that observation. It captures non-linear or non-monotonic relation to default and smoothes observed data. The use of this method reduces the impact of outliers in development and avoids nonsensical results when using the model.

Figure 6.22: Fitting the Actual Default Events to Model



Source: Moody's KMV Modeling Services Group

In this model, the relationship between each 'candidate' financial variables and observed default rates in the sample are analyzed and a mini-model for each is constructed. In general, variables that are readily available are intuitive to the user, not highly correlated with the other variables, and of course, strong relationship with the default activity is selected during modeling.

3. Multivariate Modeling:

In the next step, valid factors (model variables) are integrated using a logistic regression, which the functional form is outlined as follows:

Figure 6.23: Functional form of Logistic model

$$f(x) = \frac{1}{1 + e^{-\alpha_1 x_1 - \alpha_2 x_2 - \alpha_m x_m + \beta}}$$

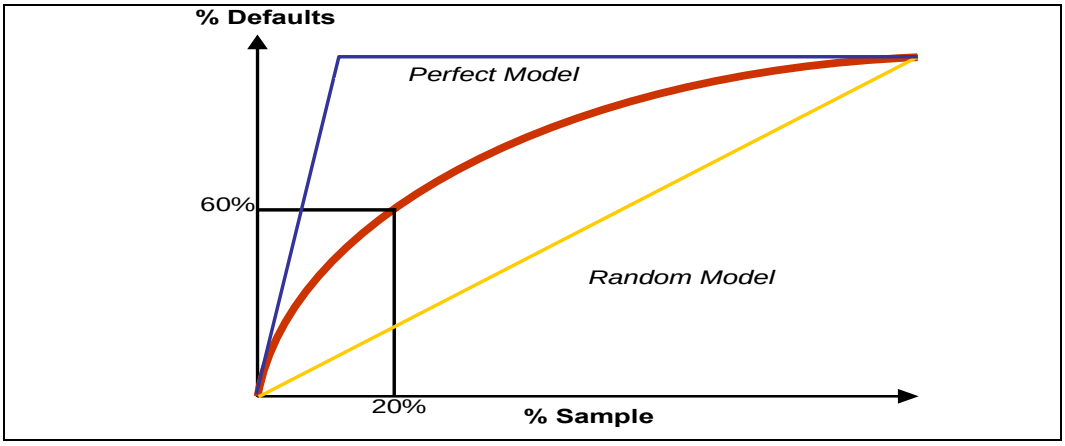
$$-\log\left(\frac{P}{1-P}\right) = \sum_{i=1}^{m} -\alpha_i x_i + \beta$$

Source: Moody's KMV Modeling Services Group

Multivariate modeling is widely accepted and understood intuitively. The importance of one factor depends on overall 'state', i.e the observed default states. A number of financial variables are selected and the power of each is tested using the multivariate modelling, which allows rapid reduction of ratio list via backward, forward and stepwise regression. Ultimately, the weight of each model variable is chosen as such to best fit the observed default data. A series of regressions are being performed to build the most desirable combination of financial variables fit best with the observed default experience in the sample. For example, forward regression starts with a reduced list of factors and adds more factors until the variance is too high. Backward regression starts with a long list of factors and removes factors until the variance falls below a threshold. Finally, stepwise regression starts with a reduced list of factors and adds more factors until the variance is too high and checks at each step whether it can replace a previously

selected factor. Following the series of regressions, the performance is measured with power curves and Accuracy Ratios are calculated for all possible combinations of between, say, 6 and 10 ratios. Finally, the most powerful of these combinations are selected as the candidate models. A Powercurve as illustrated below measures how rapidly defaults would be excluded.

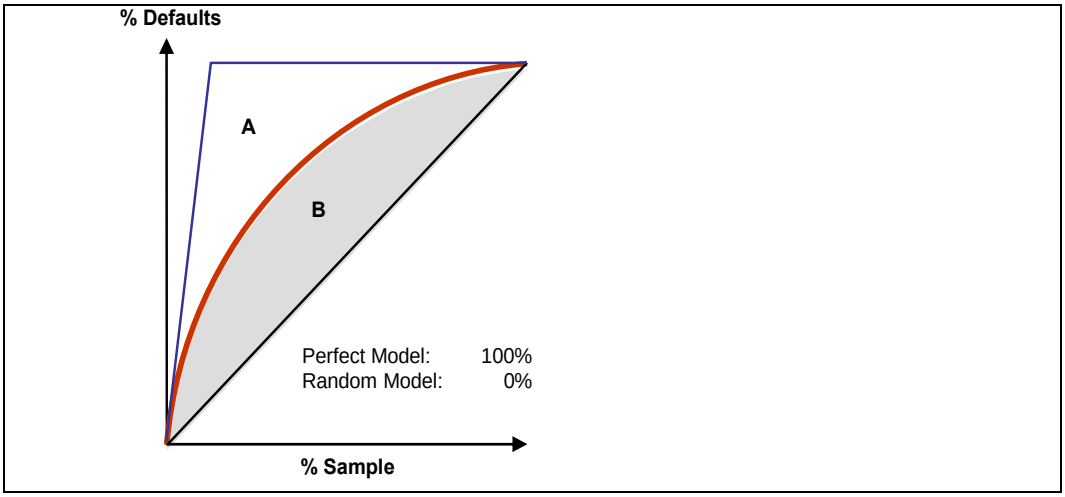
Figure 6.24: Powercurve



Source: Moody's KMV Modeling Services Group

The relationship between the accuracy ratio and a power curve is illustrated as follows:

Figure 6.25: Accuracy Ratio (AR) = B/ A+B



Source: Moody's KMV Modeling Services Group

The outcome of the multivariate analysis, 3-4 candidate models will be left to choose where further testing is performed in terms of: 1) Coverage of broad ratio categories, i.e. broad categories of leverage, liquidity, profitability, activity, debt coverage, growth and size should all be covered by at least one financial variable, 2) Power across industry, year, size, 3) Robustness and Stability (involves bootstrapping and k-fold analysis), 4) Correlation and 5) The use of most common ratios for the country.

Through this analysis, the final model will be selected as the RiskCalc country model, which is in line with the accounting and regulation of the country as well as the local default definition.

Similar to CreditEdge EDF measures, RiskCalc EDF measure provides a mapping between historical Moody's bond default rates per each rating bucket. The scale can be used as a starting point of the credit analysis process to determine an indicative rating estimate. In addition, users can also test a specific relationship between their internal rating and EDF measure and/or Moody's ratings by sampling unrated credits. Since private firms do not have publicly listed equity, the market scrutiny will be missing in the assessment of the firm. In fact, the EDF measure will only be updated as new financial statements become available. To add forward-lookingness in the RiskCalc EDF measures, a Credit-Cycle adjustment is applied. The determination of the adjustment is based upon the current average EDF of the peer group in CreditEdge system versus the historical EDF average. Peer group is determined by industry and country specification. For example, if peers are doing worse off than historical average, the RiskCalc EDF will be adjusted upward (i.e. higher default probability) and vice versa. In a sense, RiskCalc with Credit-Cycle Adjustment is a 'hybrid' model and has been widely used as either primary or benchmark model by international banks for SME credit.

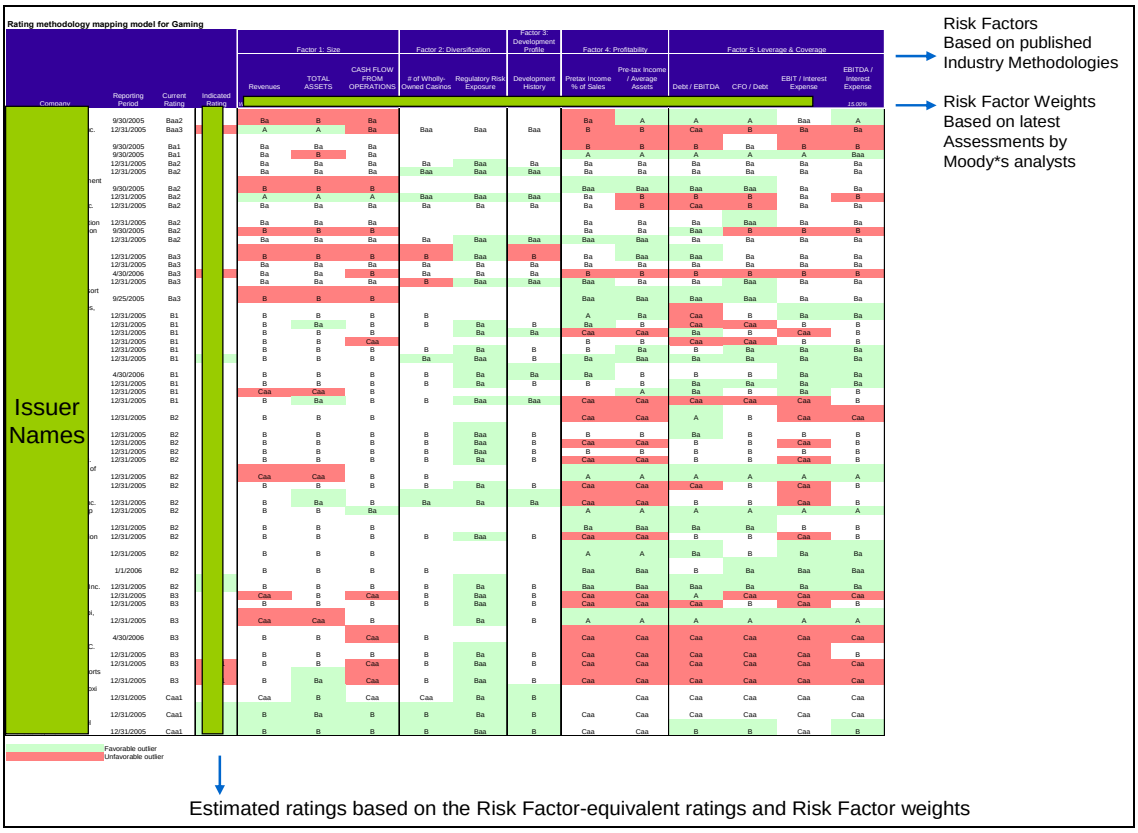
There is not any RiskCalc Turkey model due to the data insufficiencies. The Data Consortium is highly crucial for the development of such models and is encouraged because it is able to capture forward looking nature, predictive power as well as granularity of EDF measures, which may be lacking in internally developed systems.

6.6.3 Expert Judgment Based Scorecards

Moody's has developed Rating Estimate Templates using industry specific rating methodologies, which can be an efficient tool for developing internal ratings for obligors in such industries. The templates enable the users to understand the key rating methodology dynamics by describing the key quantitative and qualitative factors that combined will reflect the logic of rating determination for the rated issuers in specific industries. The Rating Estimate Templates are fully consistent with the Moody's Rating Methodology publications for the respective industries. The Financial Metrics framework could be extended to estimating the credit risks (and the corresponding historical Probability of Defaults) for the unrated issuers belonging to the same industries. In order to make certain that the financial metrics tools be best used for the bank in its determination of credit risks for both rated and unrated companies, banks need to where possible, add adjustments to the Rating Estimate Template to better fit the Bank's present investment portfolio. Similar model development steps described in RiskCalc can be applied, but the difference is that the selection of ratios is based upon the bank experts and its internal default experience. Plus, banks may overlay the elements of long-term economic and industrial dynamics to the credit risk estimation by taking advantage of the extended historical trend data within Moody`s. The framework seeks to provide very good matches between the actual and estimated rating of the rated companies within the industry using standardized quantitative and qualitative inputs. Still, depending on the degree of diversity and homogeneity of the rated companies in a specific industry, some biases may become unavoidable. Country of domicile, sub-industry specialization, wide rating ranges within the industry, etc, to name a few possible sources of variance. Banks need to analyze potential "biases" that exist in the Rating Estimate Template framework based on the information from Moody's Methodologies and statistical inferences, and apply adjustment factors for minimizing

the biases when assigning the estimated credit risk rating to the unrated borrowers in the bank's debt portfolio. The use of the Rating Estimate Templates does not mean a rigid and inflexible approach to assessing credit risk. It is recommended that the Templates are reviewed in conjunction with the bank's portfolio, and then bank's experts recommend enhancements. A key component of this 'adjustment process' is spending a significant amount of time going over default case studies and conducting interviews with senior executives of the bank. Then further consider economic and industrial dynamics to refine the Templates and the rating output further. In cyclical industries, estimated ratings may over-estimate the credit strength of the rated issuers during an upturn and under-estimate during a downturn. When assigning credit risks to unrated borrowers, it is important to incorporate the general industry trend to reduce the over- and under- estimation. (See in sub-chapter 5.2.1.5 Rating Assignment Horizon of Chapter 5)

Figure 6.26: Illustration of Sample Templates



Source: Moody's

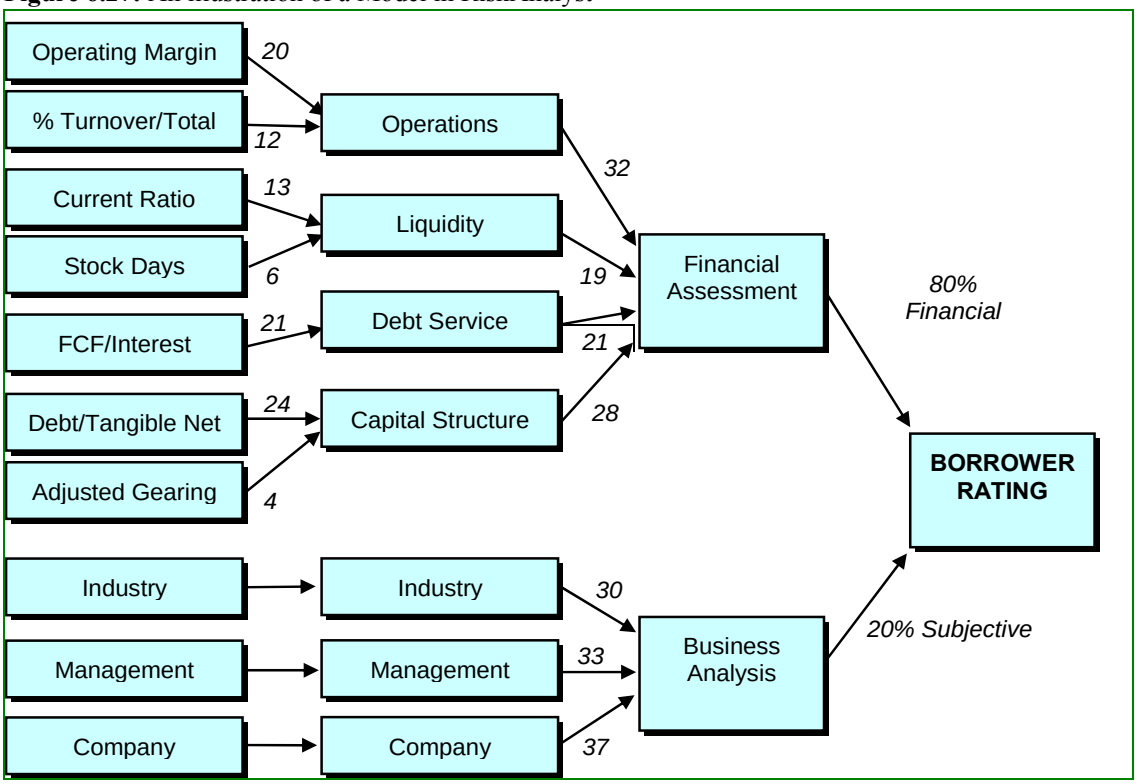
Objective benchmarking require to seek a model/system that focuses on the credit risk fundamentals of the specific debts and the borrowers as the bank's low default industries portfolio. The use of credit ratings and the methodologies of Moody's is an attempt to try to attain as high a match as possible. The final result of the matching process is the development of the matrix where Moody's ratings are aligned with the Bank's to so that the model's PD estimates can be mapped with Moody's rating-level specific historical default probabilities. Regarding the qualitative overlay, the aim is to capture all aspects of the credit risk which are not covered by the financial variables and to include a forward looking element in the rating model. Provided that the qualitative scorecard has been in use for some years, i.e. availability of historical data points, the starting point is to use the already validated financial model as suggested

above and add a huge dataset for the qualitative overlay. Then, Power Curves for different stages of the model are prepared, in order to capture the increases to the discriminatory power of the rating model with each addition. For example, construct power curve for:

1. Financial variables only
2. Financial variables + Qualitative Overlay
3. Financial variables + Qualitative Overlay + Support/Guarantees
4. Financial variables + Qualitative Overlay + Support/Guarantees + Override

Following the above exercise, the weights of the qualitative overlay need to be optimized to achieve the most discriminatory power of the overall rating model.

Figure 6.27: An illustration of a Model in RiskAnalyst



Source: Moody's KMV Modeling Services Group

Sometimes not all information can be captured by the financial statement of the borrower and rating framework heavily relying on these financial factors need to be adjusted with judgement and other subjective factors. That being said, the judgemental factors can also be a source for bias where caution needs to be practised to avoid optimism or conservatism.

6.7 Phase 5: Single-Obligor Assessment Processes

The integration is required when more than one solution is used to address different segments. For example, this may arise where both an internal model has been developed and an external model is used for benchmark purposes. In all cases the results of the tools must be integrated into the overall assessment and decision processes. The days of having a rating just for the sake of saying you have a rating are

over, the "use test" is a key criteria for compliance under Basel II. Please refer to the commentary on the ICAAP "Use tests" in Chapter 3, sub-section 3.4.3.3.1. This phase should also include the design of the monitoring processes for the rating history database, in order to provide the feedback loop for subsequent reviews of the individual risk assessment tools. This is another key requirement under Basel II[190] under the responsibility of GRM as mentioned in Chapter 5, sub-chapter 5.4.

6.8 Phase 6: Development of an IRB Validation Framework

To assist the bank to administer an ongoing validation process, a validation framework needs to be developed and provided to the supervisors as indicated in sub-section 3.4.3.3 of Chapter 3. The framework should provide documentation and guidelines on the approach to be adopted in the ongoing validation process, covering such issues as validation principles being adopted, and guidelines for their specific application to such aspects as data, quantification methodologies for the various asset classes / segments, the control processes, and associated documentation.

One benefit of the establishment of such a framework is that it will enable the bank to maximize the amount of future validation work able to be undertaken in-house. Further, to the extent that some involvement of external or independent validation experts is still required (see Internal Audit and GRM QC in Chapter 5, sub-section 5.4.5.3), the existence of a well applied validation framework will minimize the time required for them to complete their tasks.

The following is a summary of the model validation approaches that are commonly used in the marketplace and some are referenced also in the Basel II Working Paper No.14[191]. A complete validation framework should not only include model, but also data, system and process validation, which the thesis discussed in Chapter 5, sub-section 5.2.1.11, Validation. In addition to discussions in Chapter 5, the model validation will only be discussed here.

Using actual data from the target population, the testing can evaluate both power and calibration. It can also be assessed relative to other available benchmark models or data sources, such as Agency ratings, RiskCalc or CreditEdge EDF measures. In general, a good assessment should also include an analysis across sub-populations, such as industries, size groups, and time periods. For example, how well does the model perform in industry x, size y and z periods? Finally, how well does the model perform overall? This question will filter the data population such that the validation sample is representative of the bank's portfolio.

Depending on the model in question and business objectives, the testing should also be done for different time horizons where clear distinction is made between PIT and TTC models. To avoid over fitting to the sample, there should certain controls and tests both in and out-of-sample.

190 Basel II 'International Convergence of Capital Measurement and Capital Standards', Paragraph 264. Gaumert (2005, p. 15): Grundsaetze Ordnungsmaessigen Ratings, Basel II und MaK konforme Organisation des Kreditgeschaeftes.

191 Basel II Working Paper No.14, 'Studies on the Validation of Internal Rating Systems', Rating and probability of default validation, February 2005

Power curves and Accuracy Ratios are the base for the following tests:

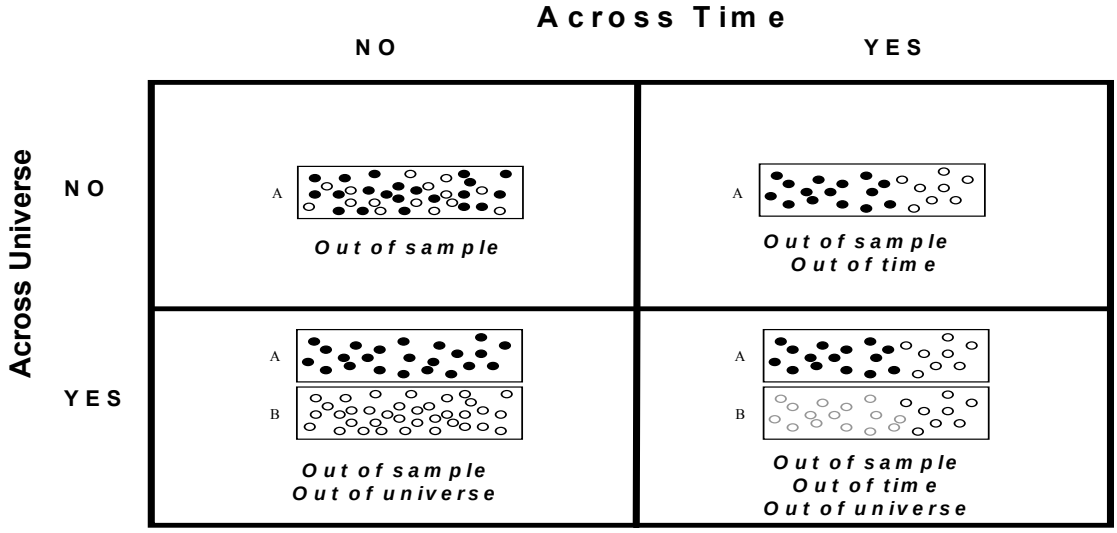
1. On overall sample and sub-samples:

- Power by year
- Power by industry
- Power by Size (Turnover or Total Assets)
- Power by Region
- Power by Audit Quality

2. Out of Sample Tests:

Out of Sample Tests provide a test of model over fitting and measures the out-of-sample performance. Some possibilities of these tests are illustrated as below.

Figure 6.28: Testing Samples



Source: Moody's KMV Modeling Services Group

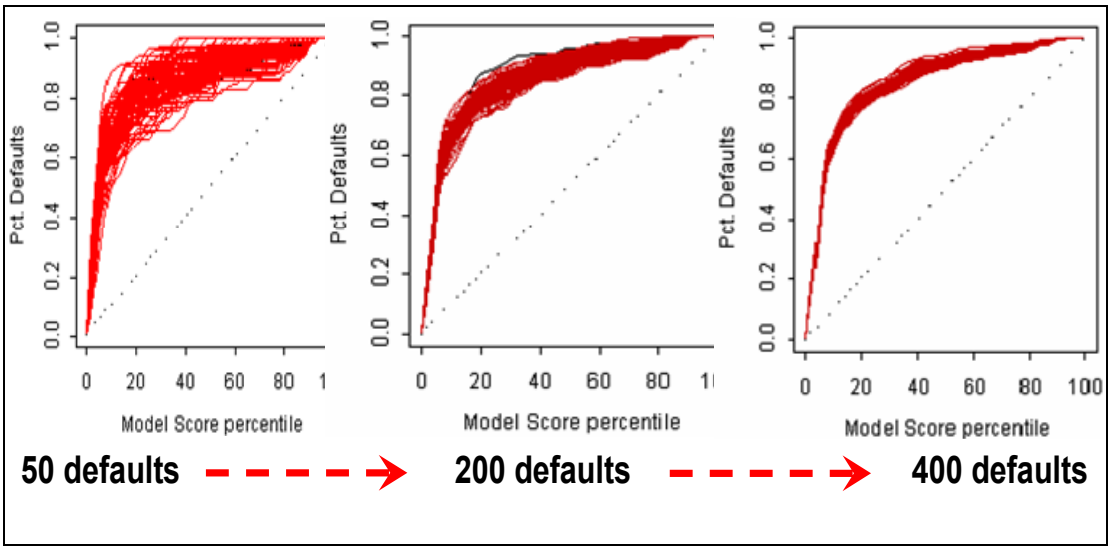
One type of out-of-sample testing is Walk-forward tests where the model is estimated on the data up to a certain point in the past and the future year is scored with this model. Then, the cutoff for the estimation is advanced by one year and the next year is estimated until the data is exhausted. Once the "out-of-sample" sub samples are scored, accuracy ratio and the power curve are calculated for each.

3. K-Fold Tests:

K-Fold tests measure how stable model performance is throughout the sample and can be used in the model validation process. For example, divide defaulting and non-defaulting companies into k equally-sized segments. Note that these k subsamples are temporally and cross-sectionally independent. Then, estimate the model on *k-1* subsamples and score the *k-th* subsample. This procedure can be repeated for all possible combinations and put the k scored "out-of-sample" subsamples together where the accuracy ratio and power curve are calculated.

4. Bootstrapping:

Figure 6.29: Bootstrapping



Source: Stein, Roger M., 2002, Benchmarking Default Prediction Models: Pitfalls and Remedies in Model Validation, (Moody's KMV, New York)

A sample of 20,000 non-defaulters with a varying number of defaulters was analyzed 100 times using a bootstrapping technique. As more defaults are added the confidence of test is greatly improved. One can see, however, that even with 400 defaults, it can still do better. This highlights again the importance of Data Consortium in Phase 2. Additionally, more defaults allow larger 'hold-out' samples. In addition, model can be reviewed on the basis of model development methodology, major concepts, applicability and feedback from lenders and risk analysts. Most of these aspects were covered in the thesis in relevant sections. However, a few more can be added to gain a complete picture. For example, model can be tested in terms of early warning signals, i.e. is differentiation early enough to support corrective action? Another example would be the test for significance of the model i.e. is there sufficient data to trust any of the above results and why should we trust these? The importance of the data pooling initiative was discussed earlier in Phase 2. Finally, user acceptance needs to be tested, i.e. will users find the model intuitive? This is crucial in embedding a bank's own credit culture.

6.9 F-IRB Implementation Plan & Schedule

This indicative high level work plan is dependent on a number of assumptions, including availability of data, IT and human resources and bank's timely decision-making process. The actual time and activity will differ with the requirements of each bank, so the work plan is just illustrative.

Table 6.2: F-IRB Implementation Road Map

F-IRB Road Map – Activities (Phases 1 - Phase 7)				
Milestones	**Data**	**Process**	**People**	**Systems**
1	**Gap analysis**			
2	**Design the data structure (including loss & recovery data)**	**Design a CRM solution**	**Training Plan**	**Specification for an IT system framework – RiskAnalyst**
3	Implement the data infrastructure		Training - Fundamentals of credit	Implement Borrower and Facility Rating System –RiskAnalyst
4	Collect Data - Borrower and Facility data	Build Borrower Rating Models - Internal & External (EDF Models)	Financial Analysis and Rating methodology training	Reporting - Custom Reports
5	Collect Data - Loss and recovery, Collateral & guarantee	Implement F-IRB Facility rating model	Train the trainers on new rating systems	Basel II F-IRB Capital Calculations
6		Validation Framework - existing Borrower rating models	User training on new rating systems	Regulatory Reporting and disclosure - Custom Reports
7	Ongoing data collection	Roll-out F-IRB approach		

Source: Moody's KMV Credit Risk Specialist Group

In order to provide a sense of the timeline associated with the F-IRB related component of the project implementation, the following indicative, high level work plan has been developed.

Table 6.3: Timeline of the Implementation Phases

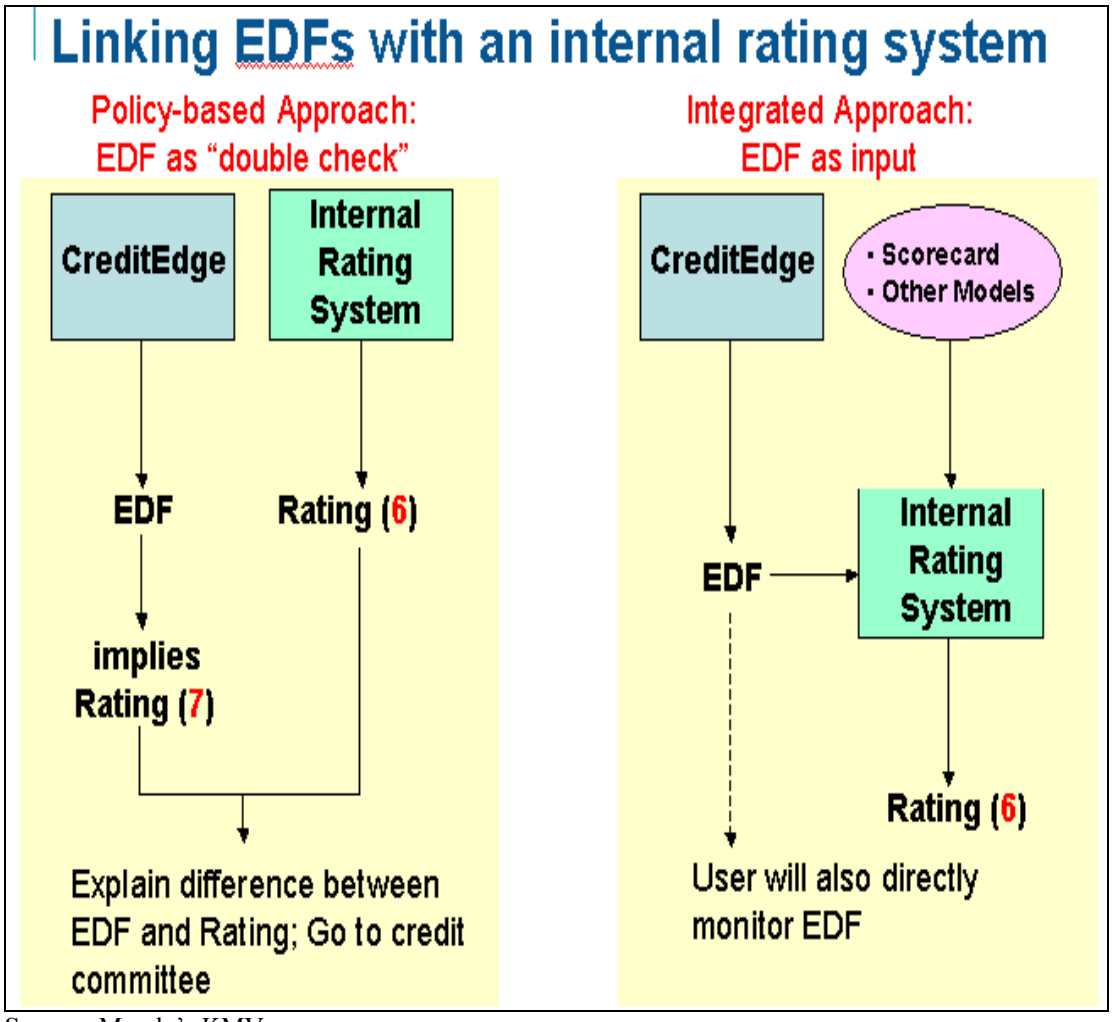
Phases	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Confirm Project Objectives																				
Phase 1 : Gap Analysis																				
Phase 2 : Data Infrastructure																				
Phase 3 : Internal Rating Infrastructure– Risk Analyst																				
Phase 4 : PD Models Internal or EDF Models																				
Phase 4 : Expert Models and Rating Scorecards																				
Phase 5 : Single-Obligor Assessment Processes																				
Training in Single-Obligor Risk Assessment																				
Phase 6 : Development of an IRB Validation Framework																				

Source: Moody's KMV Credit Risk Specialist Group

6.10 Phase 7: Use of External Models for Benchmarking

There are many ways to incorporate the external risk model (such as EDFs) into the bank's overall rating framework. For example, the internal rating may be constrained by an external benchmark. Another approach would be where the credit officer would have to explain any significant discrepancies between the internal grade and the EDF. These all serve to provide a more robust and preventative assessment system for the customer's risk.

Figure 6.30: Linking PD's to Rating Systems



Source: Moody's KMV

The completion of Phase 1 to 6 should provide a robust coverage of the bulk of corporate credit exposures. The combination of EDF models along with the internal models will provide a Basel-compliant best practice framework for assessing the risk of borrowers. Pillar 2 requires that the banks present evidence such that the best practices are in place and that the sufficient processes, data and models are in use at their banks. Benchmarking, back-testing as well as stress-testing are components of the supervisory process in Pillar 2 as discussed in Chapter 3, sub-section 3.4.3.3. EDF models, in that regard, can serve in all those components because they capture changes in the credit cycles and are highly tested on extensive data and widely used by banks worldwide over years.

6.11 Phase 8: Road Map to A-IRB

Using the same structure, the following table provides a roadmap of the activities required to be completed in order to prepare for A-IRB status. In order to highlight the incremental nature of the A-IRB process, and the linkage to the initial gap analysis, data design and collection, the F-IRB related activities are retained (shaded).

Table 6.4: A-IRB Implementation Road Map

A-IRB Roadmap – Activities (Phases 8)				
Milestones	**Data**	**Process**	**People**	**Systems**
1	Gap analysis			
2	Design the data structure (including loss & recovery data)	Design a CRM solution	Training Plan	Specification for an IT system framework – RiskAnalyst
3	Implement the data infrastructure		Training - Fundamentals of credit	Implement Borrower and Facility Rating System –RiskAnalyst
4	Collect Data - Borrower and Facility data	Build Borrower Rating Models - Internal & External (EDF Models)	Financial Analysis and Rating methodology training	Reporting - Custom Reports
5	Collect Data - Loss and recovery, Collateral & guarantee	Implement F-IRB Facility rating model	Train the trainers on new rating systems	Basel II F-IRB Capital Calculations
6		Validation Framework - existing Borrower rating models	User training on new rating systems	Regulatory Reporting and disclosure - Custom Reports
7	Ongoing data collection	Roll-out F-IRB approach		
8		Estimate LGDs based on internal data & judgment		
8 (continued)		Model LGDs based on internal data		Review capital calculation measures under A-IRB
8 (continued)		Validation of LGD processes		

Source: Moody's KMV Credit Risk Specialist Group

6.11.1 Model for the prediction of LGD: LossCalc

LossCalc is a multi-factor statistical model where the model variables determine the LGD. The determination of model and its variables follow the univariate and multi-variate modeling steps on recoveries and the variables such as:

1. Collateral
2. Debt characteristics (Debt-Seniority type)
3. Industry status
4. Firm structure
5. Macroeconomic conditions in country and jurisdiction
6. Firm-specific (if available) or Industry/Country specific Distance-to-Default

A bank can select 6 levels of collateral support, which are 1) Cash & Marketable Securities, 2) Pledge of All Assets, 3) Secured by Unknown, 4) Property, Plant &Equipment, 5) Subsidiary Support and 6) Unsecured.

The sample data set used to develop the model covers the period 1981 – 2003 and captures over 3,000 LGD observations globally on public & private firms; rated & unrated debt; loans & bonds across 23 years. Moody's KMV performed out-of-sample testing to ensure the power of the model was unbiased. LossCalc significantly outperforms the traditional look-up tables, which are widely used by banks[192].

In addition, MKMV empirical research suggests that there is a relatively strong correlation between the default rates and recoveries. For example, during downturns when defaults are high, the recoveries tend to be lower on the transactions. To incorporate such credit cycle trend, Distance-to-Default (DD) was used as a factor into the LossCalc LGD model. For public firms, the Distance-to-Default measure available in the CreditEdge EDF databases is used and the levels are updated monthly. For private firms, an 'index' approach is in place. Given the industry and country that the firm belongs to, it factors in the peer group DDs in the LGD model for non quoted firms to reflect the point in the cycle. Consequently, LossCalc LGD measures tend to be predictive and forward looking across transactions and form an external benchmark model for downturn LGD estimations.

6.12 Phase 9: Portfolio Analysis & Economic Capital Management

6.12.1 Importance of Portfolio Management

Credit portfolio management is at the forefront of financial institutions minds due to many influences in the market from regulators through Pillar 2 discussions, market participants through competition and senior management requiring information on portfolio level for their strategic decisions. For many international financial institutions, these changes have not impacted the way in which they do business as they have been leading this revolutionary change. For others in less developed markets, such as Turkey, this has been met with real challenges. Firms that are at the forefront of managing credit risk and achieving higher returns per amount of credit risk or economic

192 Gupton and Stein, Moody's KMV, "LossCalc V.2: Dynamic Prediction of LGD", January 2005.

capital, have a common high-level strategy: *they all manage their credit portfolios actively.* Active credit portfolio management is a portfolio management strategy designed to: diversify the portfolio better, reduce portfolio volatility (unexpected loss), improve return/risk, use economic capital more efficiently, create capacity to do more business and increase shareholder value. The strategy involves holding credit only when the firm is being paid well for the marginal portfolio risk, reducing concentration, which is portfolio correlation caused by excessive investments in single names, countries and/or industries and deterioration in credit quality. The role of the active portfolio management for the loan product group has been discussed in Chapter 5, sub-section 5.6.2 from an organizational perspective.

Credit portfolio management is a broad scope that requires timely and accurate measurement of default probabilities, which the sources are to be found in the F-IRB and A-IRB phases of the implementation project. It also involves an understanding of the interactions of default risks; migration and correlations among assets in the portfolio because analysis results can vary greatly depending on risk parameterization and analytics used within correlation and credit migration framework. Finally, it ensures sophisticated methods are in place for measuring and improving portfolio performance, which can only be achieved by understanding the risk/return aspects of a portfolio. One needs a bottoms-up portfolio analytics that facilitate market based credit measures, accurate correlations measurement as well as granular and predictive migration probabilities stretching out to multi-periods, in contrast to the one step period analysis in the Basel II framework. For example, the analytics and framework in RiskFrontier (RF) are extensively used for multi-period analysis stretching from 0.25 years (3 months) to 7 year time horizon, which means that any point in time between these boundaries can be entered as a future analysis horizon for portfolio value/loss distribution construction. The predictive and granularity of the credit migration framework ensures that the exposure and portfolio value take into account of credit quality changes in the future up till the maturity of the transactions.

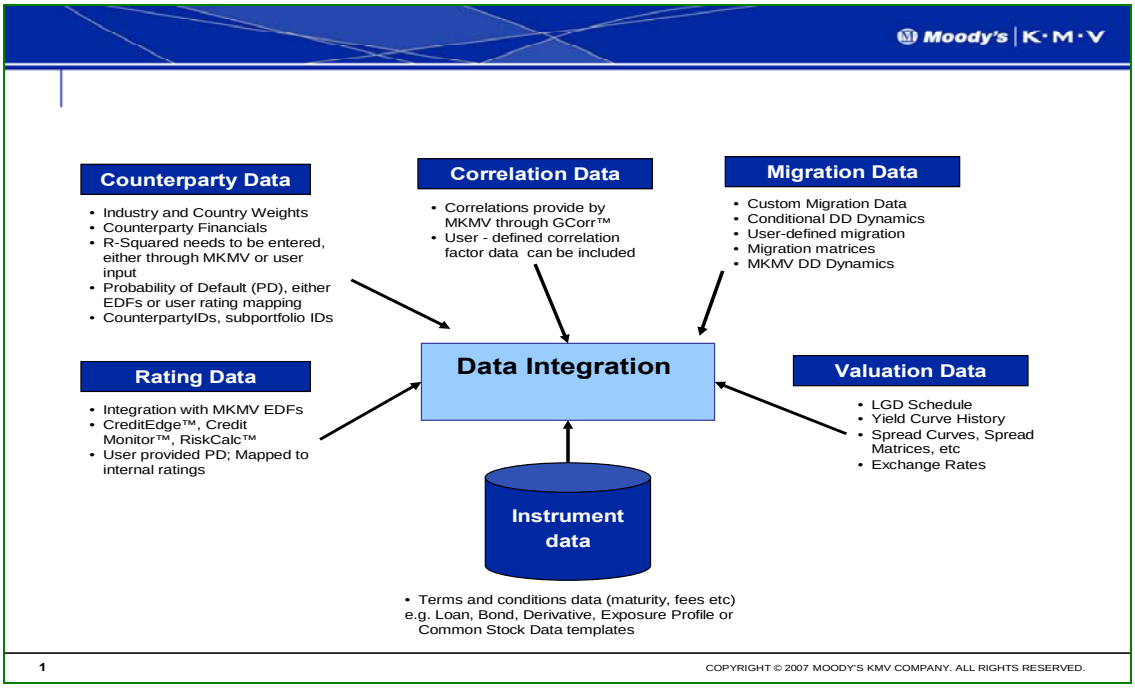
Economic Capital and Active Portfolio Management take the regulatory framework to a step further and hence requires a large amount of data for modeling purposes, which is indeed highly challenging. Some of these challenges have been met with the Basel II Pillar 1, which ensures internal rating, PD, LGD and EAD models are developed within each bank and processes are based on robust data infrastructure and system crucial to ensure the data and model are accessible and being used to its capacity. However, correlation is a hard parameter to model that requires huge databases of data spanning across regions, industries and different sized firms for a long period of time. Moody's KMV has researched and modeled (asset) correlation for over 15 years, and this experience and the datasets developed can be used in credit portfolio modeling. Financial institutions need to have the flexibility to compare and contrast different correlation models to each other to ensure they have a good understanding of the correlation risk of their portfolio. The same stands for other portfolio credit risk drivers such as migration risk. Financial institutions need ways to compare/contract and combine different views of migration risk in one platform to get a more thorough view of the underlying credit portfolio. The rapid development and sophistication of the structured credit markets has magnified these modeling challenges. Many financial intuitions will be, or already are, involved in structured credit products, such as CDSs, CDOs, and ABSs. Whether these products are used for regulatory capital relief, risk reduction strategies, or ways of bring new asset classes and exposures into the

portfolios, very few have been able to model the true impact these products have on the portfolio. For example, many financial institutions are buying tranches of securitizations from other countries with the belief they are diversifying the overall portfolio. These portfolios could, in fact, have many hidden concentrations given the collateral pool of the securitization may have the same name referenced, or in same country, or industry. Given all these changes in the market place, RiskFrontier provides access to the rich correlation and migration model that Moody's KMV, but can compare and contract these models to bank's own internal models (if any), or to other externally available models. RiskFrontier also allows users to model the entire credit portfolio with specific models across a very large number of instrument classes. This capability becomes more important when considering the emphasis given in Pillar 2 for best practice, portfolio capture of concentration risks and stress-testing as mentioned in Chapter 3, sub-section 3.4.3.3. All types of instruments, including vanilla loans, loans with embedded options, bonds, revolving lines of credit with/without contingent usage schedules, CDS's (buying or selling), CDOs, retail products, basket default swaps, derivatives and equity are instruments RiskFrontier (RF) users can model.

6.12.2 Data Infrastructure

In general, basic instrument-level information, such as facility and counterparty details, origination and maturity dates, etc. are required as well as default probabilities, LGDs (which are estimated through Pillar 1) and counterparty information, such as industry, country, etc. The sources of LGD, PD, migration and correlation can be internally based models or Moody's KMV based models, e.g. EDF measures, GCorr (Moody's KMV's Asset Correlation model), DD Dynamics (Moody's KMV Empirical Credit Migration model). Please refer to the diagram below for an overview of data requirements.

Figure 6.31: Credit Portfolio Data Integration



Source: Moody's KMV

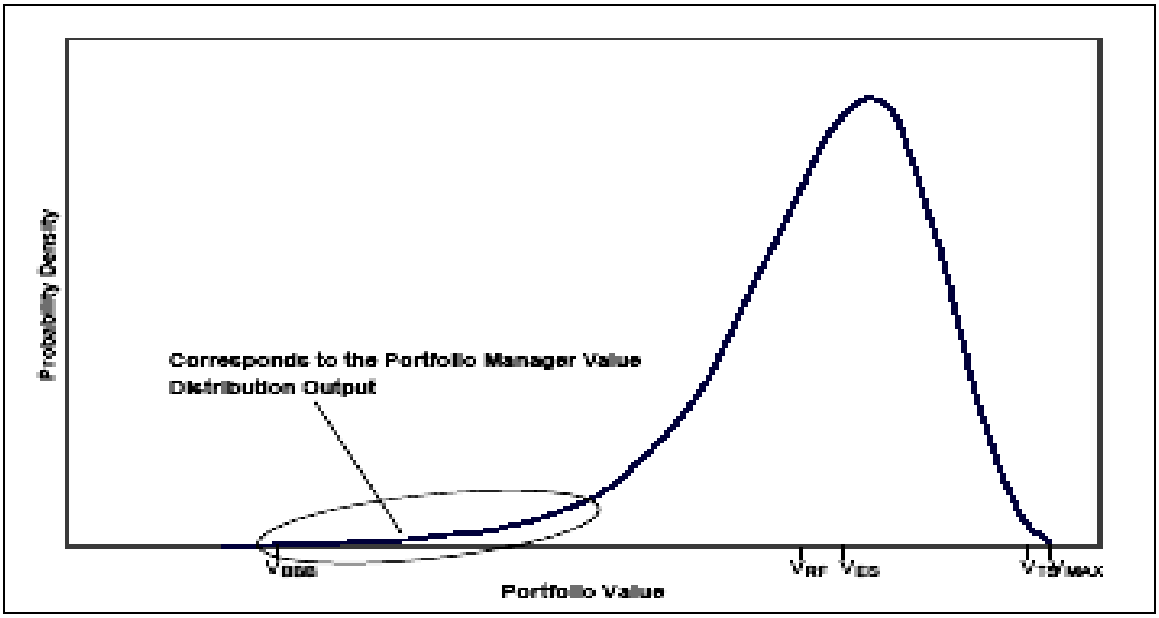
6.12.3 Model Framework

RiskFrontier utilizes the Sharpe/Markowitz portfolio analysis framework to optimize the risk/return trade-off. Portfolio risk, broadly defined, is the risk in changes of the market value of the portfolio. The approach uses value-at-risk (VAR) measurements and is fully consistent with methods employed to measure 'market' risks such as currency and interest-rate risks. With a VAR model, the quantity of required capital is the quantity of risk in the portfolio.The key determinants of Portfolio Risk and Return in this framework are:

1. PD (at F-IRB or A-IRB phase)
2. LGD (at F-IRB or A-IRB phase)
3. Credit Migration
4. Valuation
5. Correlation

The PD and LGD selection is already discussed in the earlier phases of the implementation project; therefore, correlation and migration approaches will be explained in this sub-section when portfolio analytics is concerned. Using Monte Carlo simulation, the system calculates the distribution of portfolio values at the chosen horizon.

Figure 6.32: Credit Portfolio Value Distribution

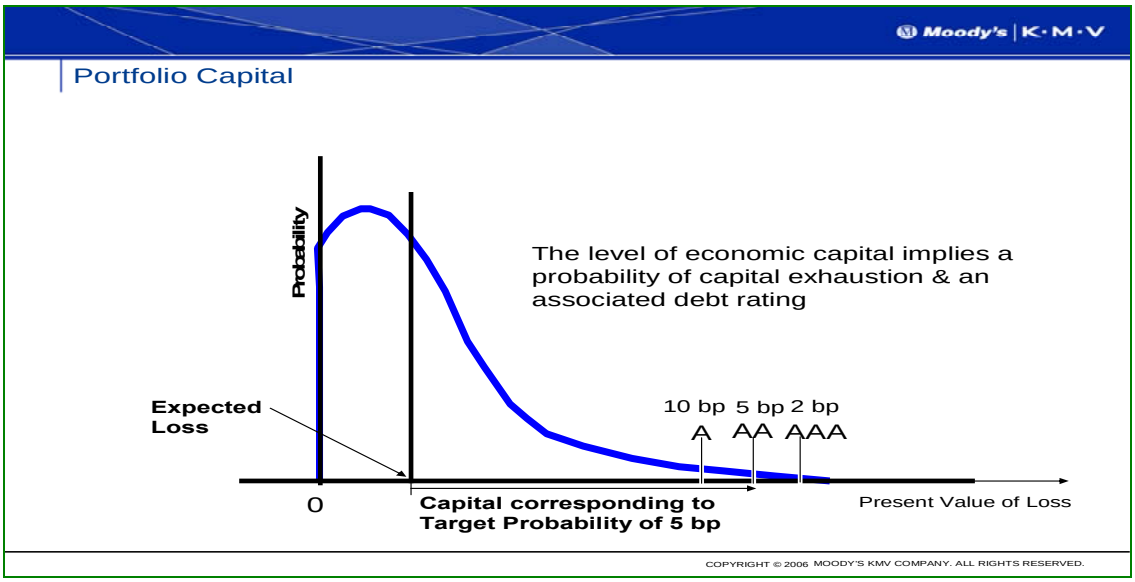


Source: Moody's KMV

Each value on the portfolio value distribution can also be associated with a portfolio loss. Thus, RF can associate a probability with each possible portfolio loss (or value at risk). VAR is calculated through simulation. For each trial, RF calculates the value of the portfolio by aggregating the simulated instrument values. This includes the recovery value for defaulted instruments and the value of the non-defaulted instruments which is determined by the realized credit state of the underlying obligor.

As a result of the Monte Carlo simulation, the portfolio value/loss distribution at horizon can be constructed. In essence, the Economic Capital can be computed as the present value of portfolio losses at the "as-of" or current date of analysis, given a target probability (bank's desired level of safely or capital exhaustion) on the loss distribution that the losses exceed Economic Capital as illustrated below.

Figure 6.33: Credit Portfolio Economic Capital



Source: Moody's KMV

RF constructs value/loss distribution for each exposure, which is the losses that result from changes in the exposure value, taking the valuation of an exposure caused by changes in the credit quality of the obligor over a measured time horizon. For exposures that mature after the horizon, credit migration is taken into consideration.

The biggest challenge in credit portfolio modeling is the parameterization of various credit portfolio drivers, such as correlation, migration and valuation. RF not only includes the robust and advanced technology from the Moody's KMV research team in these critical areas but does so using a uniquely powerful database of default history, asset value measurements and market prices. Moreover the model is transparent which enables all users to compare and contrast their own views of these parameters with those of the model. Each of these three critical areas merits further information.

6.12.4 Credit Migration

RF simulates instrument value realizations at each credit state of the world. The change in the value of the exposure at future time horizon, if not in default, can be determined by either the user-specified rating transition probability matrices or MKMV Empirical Credit Migration model (Distance-to-Default(DD) Dynamics). In contrast, some models in the market, CreditRisk+ focus only on the default probability at one future time horizon, thus ignoring maturity as a risk factor, in the construction and analysis of the credit portfolios. This form of modeling essentially (often referred to as Default/No Default) assumes that there are only two states that a loan can be in: normal or in default. The probability of increases in risk that may lead to default is not calculated.

This drawback becomes most important in the context of higher risk and longer-dated instruments. In the new Basel framework, maturity is defined as a 'risk factor' side by side with the default probabilities, exposure at default and recovery rates. DD Dynamics focus on both default probability and credit migration at horizon, and treats maturity as a risk factor as intended in Basel II framework. Ignoring maturity as risk factor is a huge underestimation of the risk associated with instruments that are held in the portfolio till maturity date as it will not pick up on any value changes at the horizon that may lead to large losses in the future.

Other models such as Credit Metrics also provide a migration matrix however these matrices have the drawback that they are not based on market measured data but rather on the tables produced annually by the rating agencies. These tables have three significant drawbacks: they are based on a much smaller sample of firms, the sample is very biased towards the very largest firms in the largest economies and third they lack the dynamism of the marketplace as agency ratings are notoriously slow to react to changes in credit conditions. Moreover estimations using historical data are backward looking in nature. DD Dynamics uses the forward looking EDF values when assigning the forward survival probabilities and transition matrices are based extensive empirical work of 33 years of default data globally.

Another substantial disadvantage to the use of ratings-based migration estimates is that they are formed as an aggregate probability given a rating category, and may mask information that is counterparty-specific. It follows the assumption that all obligors in the same rating category trends the same in terms of credit quality deterioration or improvement. The granularity is limited to differentiate among credits and the obligor-specific term structures are ignored. The reality is that not all BBB-rated firms have the same credit quality or future prospects and EDF measures solve this issue by forming the basis of its analysis on firm-specific data to reflect on individual counterparty risk, i.e. firm's market data and capital structure. The range of EDF values are from 1bps to 33%, which compared to the ratings is highly granular. It is an absolute measure of risk as opposed to relative measure such as the ratings.

6.12.5 Valuation

As RF takes into account not only default events, but also migration, the model can extend its framework to a valuation of the credit asset at maturity with migration taken into account. Understanding the possible changes in value of an asset and a portfolio are an increasingly crucial aspect of portfolio credit risk modeling. In this regard RF has introduced a new and powerful lattice valuation method[193] that assesses the optionality that is generally embedded in credit instruments. By assessing the credit migration of an instrument at several points in time before the horizon the lattice valuation model can evaluate the probability of different actions the borrower might make. These options/actions include prepayment, change in usage, default, call and put options. This valuation model is unique in the marketplace and assigns an exposure's return versus its risk considering all aspects of the transaction from embedded options, migration, etc.

193 Moody's KMV 'Lattice Valuation Model' whitepaper, Yashan Wang and Bin Zeng, September 2006

6.12.6 Correlation

Defaults can arise among a series of connected risks. It is this combination of defaults that can be the most dangerous threat to a bank and so a great deal of thought and research has been put into the measurement of risk correlation. Unfortunately, default correlations are not empirically observable. Volvo and its suppliers have not defaulted together to date. Does that mean the correlation is zero, if Volvo is placed in default will its suppliers be unaffected? The answer is certainly no and banks cannot ignore these risks simply because they are so hard to measure.

In order to measure correlations, RF's Global Asset Correlation Model (GCorr)[194] was designed that could operate at the borrower level. In other words it is not only capable of specifying correlations between default events, but also migration events for individual exposures. Top down approaches, such as CreditRisk+ fails to capture correlations individually since there is no focus at instrument/counterparty level. Rather, top down models try to approximate using historical credit losses on comparable portfolios, e.g. sector analysis. This approach may be appropriate for homogeneous portfolios, such as a bulk of credit card portfolios, but for large corporate, commercial and SME portfolios, it will be highly inappropriate as it will underestimate the risks associated at the tail of the loss distribution where extreme losses are mostly incurred and eat up shareholder capital.

In an attempt to provide some insights into other correlation models and their drawbacks, the thesis will start by looking at Equity Correlation models[195], such as CreditMetrics. Essentially, equity correlation models aim to measure how much two firm's market equity caps vary together. This is a poor proxy for capturing the co-movements in the underlying asset (business) value of the obligors because changes in leverage can obscure the asset correlation. Despite the fact that equity correlations are easily observable from a rich data set, they largely understate risk by ignoring debt structures of the obligors. In addition, by ignoring the leverage of the firms, equity correlation models often specify negative correlations which are very unlikely to exist.

Alternatively, one may choose to observe "raw" asset value correlation, i.e. the movement in a typical firm's asset value with another and these are mostly driven by factors idiosyncratic to those firms. Hence, observed "raw" correlations are prone to "noise", which may randomly under or overstate actual correlation. It is also true to state that sample models (e.g. sectoral analysis like CreditRisk+) will only reflect co-movement that is unique to that sample period and will not be very useful for predicting ex ante correlation over a subsequent time horizon.

Another approach which is adopted by model suppliers that do not have access to extensive market data is to use an estimate of "average" correlations[196]. These models are generally the ones that are used by consultants. This approach is fraught with danger as it tends to encourage portfolio managers to increase exposures to the largest clients as such additions to concentration risk will not be identified as such by the

194 Moody's KMV 'Global Correlation Factor structure' whitepaper, Peter Crosbie, January 2005

195 Zhang and Zeng, Moody's KMV 'Measuring Credit Correlations: Equity Correlations are not enough!", January 2002.

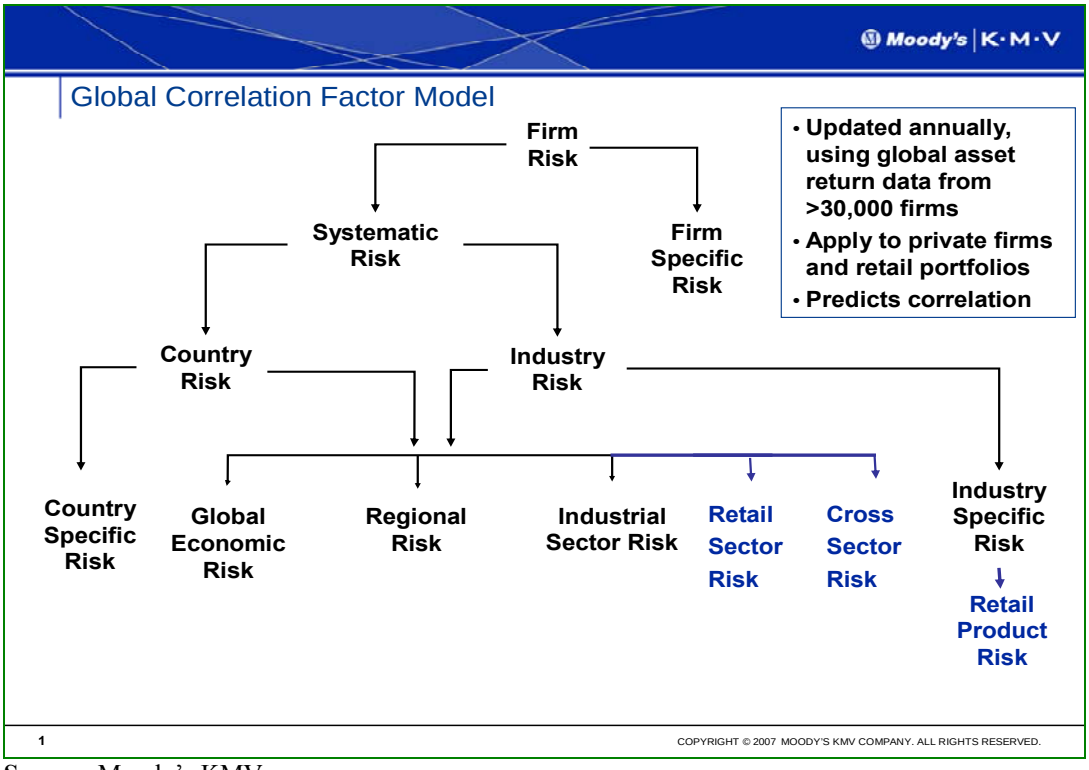
196 Zhang and Zeng, Moody's KMV, 'Empirical Assessment of Correlation Models', , November 2001

operation of the model. There is no empiric migration (often the agency tables are used) and granularity is missing in the assumptions underlying the average correlation estimates. The RF's Global Asset Correlation model has become the most widely used correlation measurement tool in the world because it overcomes the disadvantages of the alternative methods. It is fairly stable since it is a factor-based approach, reflecting global economic, regional/country and sector factors. Factor modeling is best suited to capture systemic co-movements which are the most important predictors of future correlation between asset values; the very thing that a portfolio manager needs to estimate as well as possible.

Factor model technology, pioneered in the 1970's for equity portfolios and now in common use for those portfolios, aims to determine underlying factors which cause two firms' asset values to rise and fall together, instead of observing raw pair wise asset value correlations among firms. This approach separates signal from noise/sampling error and allows for intuitive understanding of sources of correlation and for application to non-listed firms.

GCorr finds a systemic factor that captures what is common between firms as well as capture the sensitivity of each firm to this common systemic factor. In essence, knowing how the common systemic factor moves each firm will explain how firms move together. Consequently, correlation between each firm and the common factor determines the correlation between each pair of firms, thus eliminating the need to directly estimate the correlation of every pair, a huge computational task. GCorr uses 120 factors based on the global economy, region, sector, industry, and country, providing high resolution on sources of correlation. Please refer to the diagram below:

Figure 6.34: Global Asset Correlation Factor Structure



Source: Moody's KMV

The extent and granularity of the factors allow for intuitive understanding of common economic factors leading to correlation. It starts by computing a series of weekly asset returns (changes in asset value) for all 39,000 firms using observations from January 1990 till December 2006 for the 2006 correlation model. The correlation factors are updated annually adding new weekly asset returns observations each year. Using this individual firm data within countries and industries, it determines country and industry indices and continues by regressions on these country and industry indices on orthogonal macro factors constructed from asset returns. Following this process, it builds, for each firm, a "composite factor" based on country and industry composition

It then performs a second regression on the obligor asset return to compute R-squared, which is the portion of asset variance explained by the composite factor. In this second regression, it uses the latest 3-year weekly asset returns observations. Using these results relating to the systemic component of the asset return (R-Squared), GCorr determines the asset correlation among firms. Asset correlations combined with obligor's default probabilities will determine the Default Correlation, which is used if the default event occurs during simulation. If no-default, with correlated migration (correlation and survival probabilities at horizon), the value distribution of each facility is simulated, which on aggregate level determines the portfolio value distribution.

A common misunderstanding of the GCorr argues that if there is not sufficient number of Turkish firm asset return to build the correlation model then it will not applicable to use by Turkish banking portfolios. This is clearly an incorrect reflection on the model because the model tries to identify how the common systemic effects from global, regional, sectoral as well as industry- and country-specific factors and the residual left from these common effects become the firm-specific, which is diversifiable. By incorporating the most forward looking and predictive asset return data from the public EDF model, it brings valuable information on the credit cycle turns and changing liquidity conditions. It will be unjustified to argue that Turkey can be isolated from these common systemic effects as many of the credit crisis have shown in the past and continues to show that the impact of world economy as well as other cause significant variations on the Turkish economy, its market participants and ultimately their portfolio capital allocations. Considering the relatively large foreign debt in Turkey, it is very difficult to say that any liquidity conditions in the global markets will not turn into local credit events and incur large losses as correlated defaults grow.

6. 13 Overall Credit Risk Management Work Plan & Schedule

Once again using the same structure, the following table provides an indicative roadmap for developing effective credit risk management in its broadest sense, i.e. including a portfolio based approach to credit risk management and economic capital.

Table 6.5: Credit Portfolio Risk Management Implementation Road Map

Overall Credit Risk Management Road Map – Activities				
Milestones	**Data**	**Process**	**People**	**Systems**
1	Gap analysis			
2	Design the data structure (including loss & recovery data)	Design a CRM solution	Training Plan	Specification for an IT system framework – RiskAnalyst
3	Implement the data infrastructure		Training - Fundamentals of credit	Implement Borrower and Facility Rating System –RiskAnalyst
4	Collect Data - Borrower and Facility data	Build Borrower Rating Models - Internal & External (EDF Models)	Financial Analysis and Rating methodology training	Reporting - Custom Reports
5	Collect Data - Loss and recovery, Collateral & guarantee	Implement F-IRB Facility rating model	Train the trainers on new rating systems	Basel II F-IRB Capital Calculations
6		Validation Framework - existing Borrower rating models	User training on new rating systems	Regulatory Reporting and disclosure - Custom Reports
7	Ongoing data collection	Roll-out F-IRB approach		
8		Estimate LGDs based on internal data & judgment		
8	Collect Data - Returns & Costs	Model LGDs based on internal data		Review capital calculation measures under A-IRB
8 - 9	Obtain Data - Correlations	Validation of LGD processes		I
9		Risk based pricing	User training on portfolio management system	Implementing Portfolio Management tools - Risk Frontier Portfolio Manager
Annual validation of the risk rating models				
Data Warehouse				
Governance and Oversight				

Source: Moody's KMV Credit Risk Specialist Group

Note: In order to highlight the incremental nature from the F-IRB and A-IRB processes, the associated activities are retained (shaded).

6.14 Closing Remarks to the Implementation of IRB with Moody's KMV

While no single financial institution is typical, the thesis has identified the key phases that financial institutions typically experience on their way to advanced credit risk management. The Turkish banking system is rapidly growing, and has evolving economic structures that are quite different from the majority of the banking systems, to which the BIS frameworks are being applied. Without this understanding, offering the standard "here are the tools/skills the leading banks have but good luck" type analysis would simply create misleading, and ultimately unrealistic objectives for the banks, as the standard analysis do not necessarily focus on the economic reality surrounding them. On the other hand, Basel II IRB solution needs to have the ability to bring acknowledged industry best practice to the assessment of all industry segments, irrespective of their location.

To develop an appropriate solution for the Turkish banks, this chapter focused on three core dimensions; 1) Data, 2) Systems / Processes and 3) Methodologies. These 3 dimensions prove extremely powerful in providing the structure for banks' Gap Analysis of F-IRB or A-IRB road map described in Phase 1 and will be pivotal to the phasing of the solution sought in this thesis.

The importance of the appropriateness of the data available was stressed for the long term effectiveness of all risk management processes in Phase 2. This is particularly true of data on default events and recovery which are difficult to collect retrospectively in Turkey and elsewhere. Good data infrastructure should encompass data relevant to the assessment of single obligor risk, including an appropriate level of financial statement data and defaults, facility risk, based on an appropriate level of facility and collateral data, LGD & EAD, based on loan loss and recovery experience and historical rating performance. Consequently, the formation of a Data Consortium is suggested as the starting point of a successful Basel II IRB implementation project for the Turkish banking industry. The Data Consortium not only serves to the Phases 1-6 for F-IRB, but should also aim to serve banks in achieving A-IRB status outlined in Phase 8 for the development of internal LGD and EAD models.

In Phase 3, an effective internal rating system should facilitate the development of credit strategy, planning and reporting framework. Identifying the most risky borrowers, pricing for risk, and measuring regulatory and economic capital cannot be achieved without an accurate internal rating system. Without it, it is also very difficult to really take advantages of active portfolio management that entails buying and selling of portfolio of assets. There may be many purposes of an internal model ranging from credit approval/renewal, loan structuring, credit monitoring on borrower and portfolio level, limit system, economic and regulatory capital, loss calculation to pricing. The appropriate approach can differ from portfolio to portfolio and the asset type as well as the objectives of the organization.

In Phase 4, some aspects Turkish banks need to take into consideration in building their PD models were explored. Depending on the asset type, the internal models may incorporate more than one model, with hybrid approaches between PIT and TTC. The thesis aimed to analyze options varying from internal PD models to external PD models, such as the EDF models and to external rating scorecards. Of key importance to understand is that there is very little degree of isolation to global credit market

turmoil and that credit cycle is a reality for Turkish financial institutions and large corporations. Banks in most economies including in Turkey respond to cyclical changes and tend to tighten their lending policy, during recessions like in late 1980s and early 1990s and more recently in 2000-2002 and second half of 2007. This results in liquidity shortage and reduced bank funding leads to additional defaults of companies which are highly dependent on additional liquidity. *Hence, the use of internal PD models that incorporate market information will be a step forward to handle credit cycle changes*. CreditEdge and RiskCalc solutions of Moody's KMV have been explored in this context either as a primary model or benchmark as suggested in Phase 7. It is very common to have more than one solution in place and Phase 5 stresses the importance of integrating all solutions into the overall assessment and decision processes. The days of having a rating just for the sake of saying you have a rating are over, the "use test" is a key criteria for compliance under Basel II.To assist the banks to administer an ongoing validation process, the validation approaches have been explored in Phase 6. One benefit of the establishment of such a framework is that it will enable the banks to maximize the amount of future validation work able to be undertaken in-house. Further, to the extent that some involvement of external validation experts is still required, the existence of a well applied validation framework will minimize the time required for them to complete their tasks.

Credit portfolio management is at the forefront of financial institutions minds due to many influences in the market from regulators through Pillar 2 discussions, market participants through competition and senior management requiring information on portfolio level for their strategic decisions. For developing markets, such as Turkey, this has been with real challenges. Phase 9 aims to provide key guidelines in this field and shares the most successful and widely used credit portfolio management solution (Moody's KMV RiskFrontier – its predecessor, Portfolio Manager) across financial institutions globally. These financial institutions that are at the forefront of managing credit risk and achieving higher returns per amount of credit risk or economic capital, have a common high-level strategy: *they all manage their credit portfolios actively.*

Active credit portfolio management is a portfolio management strategy designed to: diversify the portfolio better, reduce portfolio volatility (unexpected loss), improve return/risk, use economic capital more efficiently, create capacity to do more business and increase shareholder value. This does not only require timely and accurate measurement of default probabilities, which the sources are to be found in the F-IRB and A-IRB phases of the implementation project, but it also involves an understanding of the interactions of default risks; migration & correlations among assets in the portfolio. Finally, it ensures sophisticated methods are in place for measuring and improving portfolio performance, which can only be achieved by understanding the risk/return aspects of a portfolio. Consequently, Pillar 1 can be interpreted as a good starting point for Turkish banks, but a further stretch needs to be pursued by the industry for Pillar 2 considerations as well as active portfolio management in the next years to come and banks need to be well prepared in advance.

SECTION IV: Synthesis and Conclusions

Chapter 7: The Synthesis of the Chapters and Conclusions drawn from the Thesis

7.1 Emergence and Importance of Prudential Supervision and Financial Stability

Since the implementation of the first Basel accord in 1988, banking business has seen the introduction of new risk management practices under many different supervisory approaches ranging considerably across the world. In parallel, financial markets have undergone significant transformations and become more global. These transformations in the financial industry exposed weaknesses in the first accord and this research concluded that the first accord is not only time-inadequate, but also system-inadequate, when Turkey's capital adequacy ratios under Basel I regime were observed against the aggregated R-Squared (portion of risk that is systemic based on market asset return observations) by Moody's KMV. The Moody's R-squared data flashed alarming signals about the increasing systemic risks in Turkey since the twin crises of 2000 and 2001. The Basel I based capital adequacy ratios proved an ineffective benchmark for a sound and safe financial system in Turkey. The reason was that in many countries, those transformations can be closely linked to increasing systemic risks, which challenge the very existence of the financial stability and cannot be captured by ratio-based capital metrics. Hence, Basel II will be tested on the level of building sound financial systems globally through more risk-sensitive measures, enhanced governance and increased role of supervision and market discipline.

Today, the threat to the financial stability is presented by contagious effects stemming from the hemispherical nature of doing business. As a result, the need for integrated, global regulatory solutions across financial systems has become much more immediate and a clear necessity. In this regard, financial stability concerns can be considered the main impetus behind the developments of comprehensive banking supervision in many countries. Not surprisingly, the new EU directive and Basel II objectives are in full harmony with Turkey's EU accession program as well as with the Turkish banking reforms introduced by the supranational anchors as discussed in Chapter 2. In view of that, BIS ascertains the importance of this issue with the statement as follows:

"Safety and soundness in today's dynamic and complex financial system can be attained only by the combination of effective bank-level management, market discipline, and supervision...The Committee believes the benefits of a regime in which capital is aligned more closely to risk significantly exceed the costs, with the result that the banking system should be safer, sounder, and more efficient"[197].

Respectively, the Basel II implementation process requires close cooperation with the regulators. Rather than following the "wait-and-see" type of approach, Turkey being on the forefront of European accession, Turkish banks and regulatory bodies need to

197 Secretariat of the Basel Committee on Banking Supervision: The New Basel Accord – An Explanatory Note. Basel: BIS, 2001, p. 1-3.

review the implementation of Basel II with a number of initial "consultation papers", commensurate with the former experiences of other leading regulators. Before enacting the new Basel framework into its domestic banking system via the imposition of "over the night" issued directives, the regulators in Turkey should start setting up the "principles of implementation" in cooperation with a workgroup from the banking industry rather than postponing the IRB to future dates. Likewise, the senior management of the banks should bear the prime responsibility of proper implementation. The thesis argued in Section II that the trade-off between choosing the standardized and IRB methods is much too large to ignore, as using standardized methods results in extra capital erosions under the new pillar system in the Turkish banking sector. Hence, decisive and corrective actions on the parts of supervisors and banks in Turkey are immediately required on the path to Basel II IRB implementation.

In Turkey, there is still room for the exercise of socially suboptimal policies only because of accident and ignorance on both banks' and regulator's part. Equally, banks also have to be cautious for the imposition of "best practices" from the rest of the world as it may not mean "best practice" in Turkey and for the national regulatory bodies. For that matter, the thesis reviewed the requirements by Basel II and their impact globally, nationally and at individual bank-level in Section II and proposed guidelines in Section III in relation to the adoption of better policies, systems and methods under the new accord, which are hoped to lead towards more systemic stability and welfare. Unfortunately, many political factors play a huge role in shaping banking sector policies. According to Barth, "uncompetitive political systems that limit democratic input and grant extensive discretion to the chief executive will not tend to adapt bank supervisory and regulatory policies that promote private sector monitoring through information disclosure rules because transparency empowers the market in general, not only those in political control". To put it uncompromisingly, socially efficient regulatory changes may disturb the powerful segments of the politico-economical elite in the country and they may not prefer to choose to implement the "best practice" methods[198]. Therefore, the Basel II implementation process demands open, competitive, democratic and effective political systems to start with. Thus, successful implementation of banking sector reforms requires country-level customizations and in the case of Turkey, the driver for the customizations is the EU as the main political anchor, flanked with the supportive programmes of IMF and the World Bank as the supranational anchors.

As discussed in Chapter 2, the Basel II implementation may not be under the sole domain of the national supervisor. In past and present, such long term implementation was/is encouraged and sometimes enforced by the "Supranational Anchors: the IMF and the World Bank" in Turkey with the argument of sustaining systemic stability under Article IV covenants[199]. In contrary to the mis-beliefs of market participants and regulatory bodies in Turkey, the international community can exert real pressure for reforms. For these organizations, the primary goals are to:

198 Barth, J.R. (et all.): Rethinking Bank Regulation. Cambridge: Cambridge University Pres, 2006, pp. 259-306.

199According to Eichenberger (2004, p. 304), the whole logic behind the current push for codes of conduct and international standards lies in the initiatives and efforts to standardize the financial and regulatory practices for all countries which seek to be active on international financial markets.

(1) Collect information,

(2) Identify, what works best in different countries and conditions in terms of banking and regulatory policies

(3) Disseminate this information to policy makers around the world[200].

Supranational anchors may even go a step further and establish a regulatory and supervisory agency from scratch as they did by the end of 2000 in Turkey, given the dire conditions, when the economic and political system deliberately chose and maintained inefficient supervisory and regulatory policies that were in contrast to the public interests. Accordingly, the compliance with Meta level standards, such as Basel II, should be a prerequisite for qualifying in the possible contingent credit lines funded from the supranationals and other global players, in particular in Europe. Indeed, this suggests the need for developing countries to fulfill regulatory duties continuously with internationally accepted norms, such as Basel II. Consequently, the importance and efficacy of Basel II's tripartite pillar system and its reforms should be viewed by political leaders and the Turkish financial institutions as being in their own interests as long as the credit lines are funded by these external institutions and EU accession continues. The bottom-line expectation of EU on prudential regulation is that Basel II nurtures the development of risk culture where the supervisory role transitions from simple "ratio watching" to "a risk-based process". Although a "Basel II road map" has been devised by the BRSA and the Turkish Bankers Association, there still remains to be an ownership issue. While subjects like effective risk management, enhanced corporate governance and prudential banking supervision, which are the key objectives of Basel II, can strengthen the financial system, macro-economic volatility should be stabilized or reduced in Turkey through monetary policies and structural changes mandated by the supranational anchors. Certainly, it is also true that macro-economic stability cannot exist without a safe and sound financial system. Typically, it is a "chicken and egg" situation and lasting results can only be achieved in the Basel II implementation if and only if all parties that make up the environmental system are fully taken into account of in the implementation process.

As discussed in Chapter 3, Basel II accord contemplates giving banks a choice in capital determination: the Standardized approach or one based on a bank's own internal ratings, namely the Internal Rating Based Approach. "The concept is sound with one exception. Each nation's regulators may stimulate the usage of one method for each other. The problem with this approach is there is no single standard for the design and operation of a model based internal rating system"[201]. If more complex IRB approaches are to be used, the range of methods and models, including diverse range of risk weights, will be far more extensive than in the Standardized approach. This is in the intention of capturing greater risk sensitive measures and systems in place at banks, but it also adds further complexity. During an analysis of successful implementation of Basel II inside the Asia-Pacific region, Jovic (2005) concluded that the most important goal is not to look for the quickest possible way to reach an internationally comparable Basel II level. Rather, achieving a continuum of different status, described as:

200 Barth, J.R. (2006, p. 272).

201 Chorofas, D. N.: Managing Risk in the New Economy. New York: NYIF, 2001, p. 224.

"Every institution that has to comply with the accord must allow enough time and effort for each critical component – people, expertise, processes, organization, methods, IT systems, data – to be soundly built, improved, deployed, validated and supported on a continuing basis. In this sense, it is crucial to remember that Basel II compliance is not just a project but the first step in a continuing process"[202].

At the outset, Basel II is a more conceptual framework than its predecessor, Basel I. Contrary to Basel I, the new accord is not a simple sole prescription for capital requirements. The smooth implementation requires extensive investment in new systems, data, models and technical know-how combined with continuous training and education in multi dimensional disciplines. Although most leading institutions may not always have the best Pillar 1 models, but they tend to have risk management staff that are experts in actuarial management, knowledgeable about the industry and the latest risk management technology, and highly analytical. They manage credit risk models in accordance with the goals and objectives of the organization, and constantly challenge the models by aggressively testing new value enhancing strategies[203]. Therefore, data retention and the sophisticated usage of the credit risk management systems for decision making and reporting under Pillar 2 and 3 are the lifeblood of today's most successful banking institutions. The foundations of data, models, validation and portfolio management are to be laid in concert with the goals and management philosophy at the hands of experienced and managerial resources of a bank. In the case of missing skills or know-how, solutions from vendors are to be sought. As the competitive pressures grow with the EU accession as well as increasing participation by global banks in Turkey, Turkish banks will be more inclined to meet international best practice in terms of their data, systems and models, but more importantly the design of the new risk management organization and the training of bank's internal staff in midst of change. In fact, whether banks go for the SA or IRB under Pillar 1, the new design should go beyond the minimum regulatory compliance and opt for market best practice as stressed in Pillar 2 with its supervisory review process and in Pillar 3 with its market disclosures that allow for market participants to identify poorly- versus well-managed banks. The role of supervision is clearly not only about determining which banks will comply with SA or IRB, but much more. This is indeed confirmed by the empirical research done by Barth, Levine, and Caprio, as discussed in Chapter 3.3. Accordingly, there is weak evidence between more stringent capital requirements under Pillar 1 considerations and the systemic banking crisis. Rather, the research found that stronger banking supervision and market discipline will overcome the banking failures as intended with Pillar 2 and 3. As a result, this thesis concluded that prudent supervision will be pivotal in communicating to the market the right differentiation among banks regarding their risk management practices, culture and profile and in sustaining the overall financial stability through the elimination of banking mavericks as a result of effective market discipline. It is important to note that despite the increasing systemic risks in Turkey signaled by the R-Squared, the result was not another crisis in Turkey due to stronger supervision led by the authorities.

202 Jovic, D.: Basel II Deployments in Asia-Pacific: Who's Ahead? In: Global Association of Risk Professionals, Issue 24, May / June 2005, p. 33.

203 Mc Cahill, L.: Organizational Issues in Building and Maintaining Credit Risk Models. In: Mays, E. (ed.): Credit Risk Modeling – Design and Application. Chicago: Amacom, 1998, p.13.

7.2 Call for More Risk-sensitive Capital Measurement: Pillar 1

Keeping pace with financial innovation and developments, Basel II introduced much more risk-sensitive measures in capturing credit quality and credit risk mitigation techniques in its Standardized approach and more so in the IRB approaches. The quantitative impact studies conducted by Basel committee as well as the Turkish national supervisor suggested, in Chapter 4, that the Standardized approach would lead to an increase of 8% in credit risk-based capital requirements and the decrease of capital adequacy ratio from 28.84% to 17.33%. A more recent study done in 2007 also depicted that the capital adequacy ratio would fall down to 13.68% at Turkish banks with the adoption of Basel II SA. The reasons are mostly due to the impact of the new risk-weighting regime under SA on loans that do not have external ratings as well as on specific portfolios and the lack of data on credit risk mitigation. On the latter, the expectation is that data will become available to see the savings realized by risk mitigation in the pricing of loans. However, there still remains the issue of capital erosion in the Turkish banking system by a factor of 30% with the implementation of SA. Hence, most large private banks stated that they would lean towards the implementation of IRB approaches by the end of 2009. With the adoption of IRB, however, supervisors need to sign off on the bank's internal rating design, validation of its internal rating and stress-testing systems. In Chapter 2, the thesis outlined challenges of IRB implementation, in relation to measurement uncertainties, data limitations due to either lack or inconsistency of data. Equally important is the lack of a single benchmark or supervisory guidelines in Turkey in the assessment IRB methodologies, systems and data foundation. In light of Basel II minimum requirements and sound practice guidelines as well as international best practices, the thesis proposed a roadmap of internal rating systems, models and data for an IRB implementation in Chapter 6.

In this roadmap, a good rating system should be designed for neither relationship management nor accounting purposes. Rather, the thesis advocated that the internal rating system of a bank should be developed to support credit risk management functions. In turn, a good rating system should be powerful in its rank ordering among bank's customers and calibrated such that it provides the accurate levels of default probability, which prevents over or under estimation of the expected losses and hence over or under pricing due to systemic clustering of more negative or positive ratings, respectively.

In addition, a good rating system should be granular such that there is sufficient range of default probabilities among borrower grades and loss probabilities among facility grades. The dual-rating framework guided by the Basel II accord supports the negotiations on the structure of the transactions and collateralization while the borrower grades remain in their nature less negotiable. Behind good risk management lies good measurement of material risks, therefore lack of granularity in rating systems will defeat bank's purpose of better monitoring, earlier intervention and fewer losses.

Agency ratings and other through the cycle measures are not generally designed to indicate or predict levels of default risks or credit pricing. Plus, they use accounting ratios that are typically backward looking. Empirical evidence reveals that "through the cycle metrics" perform generally good risk differentiation on industry-level among credits in the same grade, however, this relative differentiation is not sufficient for best practice risk management by any means. The objective of a good rating system is to

achieve accuracy in predicting levels of increasing risks as early as possible. Clearly, depending solely on accounting-based figures and ration for the credit risk prediction will not achieve this objective solely and effectively. While most banks develop models that use fundamental analysis, the thesis presented the use of EDF models to bring in the market-based information into an internal rating system, which are widely considered as best practice across the global banking industry. Empirical evidence confirms that EDF models help in more accurate prediction of defaults when conditions of borrower, economy or industry change as they do not mute the signals from the market. It also confirms that EDF models appropriately identify non-defaulters as they are based on extensive default data.

As a consequence, the thesis proposed the use of fundamental analysis in conjunction with market-based measures, in the spirit of gaining more market insight and earlier mitigation of risks when credit cycle, borrower-level and industry-related risks change before they are reported in the financial statements. Basel II also stresses the importance of using all data available to form the rating, thus a "balanced" view of the borrower and facility based on fundamental analysis, expert judgment and market-based metrics that prevent over optimism or conservatism. Quantitative models such as the EDF measures are based on extensive default data and deploy state-of-the-art credit risk modeling, and hence they can be used either as benchmark or direct input to a bank's internal rating system.

As much as a good rating system needs to pick up on credit deterioration on time, it also needs to be easily applicable and its drivers are understood across the bank. While retaining its objectivity, it should serve as a source of intuition and insight across the organization. For that matter, data archiving of inputs and outputs of a rating system is as important as the process of rating assignment. The reporting and aggregation of risks on a portfolio basis will be pivotal in the validation and calibration needed to maintain accuracy and effectiveness of internal rating system as Basel II guidelines noted.

Conclusively, a best practice risk management will empower consistent decision-making process across the organization from analysts, lenders to senior management; enable an efficient rating process and better understanding of risks by borrowers across portfolios. It should promote trend assessments, peer analysis, benchmarking and stress-testing within its system design and data capture. These should facilitate and link with the development of bank's overall credit strategy, planning and the determination of risk profile by the senior management.

Finally, the long-term effectiveness of an internal rating system and methodologies can only be assured with the extent and appropriateness of data available. In that regard, the thesis proposed the formation of Data Consortium in Turkey that serves to the development of Pillar 1 type of risk models and rating systems continuously and consistently. Without the data, it is very difficult to validate the robustness and effectiveness of any internal rating and stress-testing systems.

7.3 Emergence and the Importance of the Link to Loss Given Default

To appreciate the depth of the risk mitigation standards of Basel II, one has not to go far. Recent financial turmoil teaches a lesson. Paraphrased in the word of Soros, "The periodic crises were part of a larger boom-bust process. The current crisis is the

culmination of a super-boom that has lasted for more than 60 years. "Boom-bust processes usually revolve around credit and always involve a bias or misconception. This is usually a failure to recognize a reflexive, circular connection between the willingness to lend and the value of the collateral"[204].

One of the biggest contributions of Basel II is the "invention of LGD" and the increased attention given to the LGD analysis, not only from the regulatory, but also from an effective risk management perspective on the level of ex-ante facility and ex-post work-out processes. The measurement of LGD and hence the Recovery Rates take into consideration all efforts associated with real costs and gains on the recollection of doubtful loans, which mean that any improvement in the recovery procedures will be leading to a reduction in empirical LGDs and lower capital requirements for the following years. As a matter of fact in Turkey, the total value of assets, waiting for the recovery at the hands of the savings and deposit insurance institution is over USD 60 billion, which indicated the severity and the importance of possible LGD-related issues. However, further refinements and alternative methodologies can be added to the existing regulatory framework in Turkey, in order to gain a full insight of recovery risk, in which case Basel II will significantly contribute to.

7.4 Emergence and the Importance of Validation and Calibration

In Chapter 6, the thesis discussed the development of different PD and LGD models from the perspective of Pillar 1. The value of any models will rely heavily on its accuracy and effectiveness in predicting defaults and recoveries and in rank-ordering among different types of credits and the underlying securitization structures. Respectively, models that are effectively validated will add transparency and statistical rigor to the bank's lending process as proposed in Chapter 5 and better risk management will lead to lower costs and capital requirements as guided by the Basel II principles. A well understood and robust rating model that correctly measures risk provides a solid foundation for risk-based pricing and calculating economic and regulatory capital. More powerful models also save banks money and improve profitability[205].

Models typically are developed in conjunction with fundamental analysis, expert judgment and market-based metrics and the essence of such models should be to provide the lenders with actionable insight in their lending process. Hence, the economic value driven from the models can be validated on the basis of their practicality, precision and robustness over range of conditions and circumstances. In line with the business value of the validation process, regulators, driven by Basel II guidelines, often require validation as part of maintaining a sound risk management framework. Regulatory considerations aside, the thesis argued that proper validation creates real economic value as a robust, precise and transparent model will streamline the approval process and lead to lower transaction costs and efficiency gains.

Generally, models are developed using data that reflects the lending experience of the individual bank. If the bank experienced low defaults, for example, in the past, it may feel that the validation is a low priority task. However, it is of key importance to see

204 By George Soros Published: January 22 2008, at www.ft.com/cms/s/0/24f73610-c91e-11dc-9807-000077b07658.html.

205 "What is a powerful model worth?" Roger M. Stein and Felipe Jordao, November 13, 2003

how the models perform in the future at different points in the credit cycle. Considering that most of the Turkish banks are developing models using data only stretching back to 3-4 years (under relatively good lending conditions after the twin crisis), the robustness and accuracy of the existing internal models are largely in question under severe lending conditions when the credit cycle turns. Additionally, since the twin crisis, most banks in Turkey are expanding their businesses to new types of customers and asset classes, e.g. mortgages and SME lending businesses. The models, on the other hand, are largely developed on different portfolio compositions from the past compared to today's business. Only for that matter, validation is a vital task for Turkish banks as it should test the portfolio and the model performance against external data and new business conditions.

There is also a final challenge presented with the qualitative factors that go into most of the models. In Chapter 6, the thesis mainly focused on the validation process of the quantitative factors of a model. The reason is that the information on qualitative factors is not compiled over time under generally accepted principles in the Turkish banking sector that makes the task of validation even more difficult. Nevertheless, power curves should be constructed on the impact adding qualitative factors to the quantitative structure as suggested in Chapter 6.

The repeating theme in this thesis has been that lending conditions and portfolio compositions at banks change over time and hence Turkish banks should not see the Basel II guidelines and requirements on validation and calibration as one-off exercise. As circumstances and conditions change, banks should devise a robust framework to re-validate and re-calibrate their internal models as well as the effectiveness of their risk management decision processes as stressed numerous times in the relevant chapters of this thesis. In fact, as part of ICAAP, it is crucial to have an independent view either by internal audit or external consultants. For a successful Basel II strategy, a robust, transparent and independent assessment of model performance is a prerequisite. An ongoing validation process will enable the banks to seek and unlock value hidden in their banking systems by including new data available and improving model performance continuously.

While the decision of appropriate validation framework lies with the national regulators, the thesis suggested that by using the best practice methods (in Chapter 6), producing good documentation and enabling a robust process (in Chapter 5), Turkish banks will be able to prove to the regulators that an effective validation framework has been adopted.

For the non-Pillar 1 types of risks, which may be difficult to quantify, reputation, liquidity or strategic risk, bank should ensure that there is sufficient management oversight, contingency planning and stress-testing for the management and prevention of such risks.

7.5 Call for Better Supervisory Review Process and Additional Portfolio Considerations: Pillar 2

As banks approach the milestone of end-2009, a date the Turkish supervisory and regulatory bodies have set for the implementation of Basel II accord, the most of the focus has been applied to the Pillar 1 aspects of the accord. While the banks have made and are making considerable financial and resource investments in data capture systems and internal rating tools, supervisory and regulatory bodies have been somewhat prescriptive in providing guidelines in achieving an acceptable regulatory standard in Turkey. In addition, Pillar 2, which is a source of competitive advantage for banks with its SREP and ICAAP, are mostly overlooked by Turkish banks. The thesis argued that it is likely for the banks' investment towards Pillar 2 to be minimal due to the lack of clear direction by the regulatory bodies in Turkey. Motivated by this, the thesis aimed to be a roadmap in Chapters 5 and 6 for acceptable standards, not only at Pillar 1 level, but also Pillar 2 and finally Pillar 3.

Regarding Pillar 2, many regulators in the world have issued ICAAP, most notably the UK FSA; the thesis included their views on the effective approaches during the implementation of the Pillar 2 in Chapter 3 and argued that Pillar 2 is not about compliance, but it is about embedding a risk awareness culture and organization at banks in Chapters 5 and 6. In turn, the regulators have the discretion to reward banks that have the risk management at the forefront of their organizations and embrace the new risk culture mandated by the Basel II accord. In contrast, Pillar 2 can also work against the banks as capital requirements can increase at the regulatory discretion and becomes Pillar 1 capital plus additional Pillar 2. The extent of add-on capital which Pillar 2 aspects of the accord have the ability, will determine the competitive advantage among banks when sourcing customers and risk assets.

Remarkably, there was not any regard taken of aggregate portfolio in the Pillar 1 of the accord, only a risk weighted capital applied to the risk assets without any consideration to portfolio concentration, correlation and migration risks. In essence, each portfolio has its idiosyncrasies that need to be dealt with as acknowledged by the Pillar 2 and bear further capital consequences at the bank. In Chapter 6, the thesis proposed the implementation of an internal capital model (mostly referred to as economic capital model) that can explicitly account for the portfolio risks, such as the correlation and concentration risks. In that respect, there are a number of commercially available solutions with a variety of approaches, but the key competence lies in the depth and diversity of data foundation in economic capital models. The thesis assessed the use of Moody's KMV Economic Capital model in Chapter 6 on the basis of both extensive data foundation and robust modeling capabilities, particularly in the area of correlation multi-factor analysis and systemic risk capture.

Through Basel II Pillar 2, regulators are increasingly encouraging the use of Economic Capital modeling and reporting worldwide. The second pillar mandates the banks to calculate capital for risks that are not covered by Pillar 1, in particular addressing the risk concentrations in a portfolio, understanding the risk profile and portfolio loss distribution, stress-testing under different conditions. Economic Capital is a catch-all metric that can be used for these purposes. This trend has not been only encouraged by the regulators, but has been part of international best practice as Economic Capital has been used at banks in the strategic portfolio planning, risk-based pricing and

performance tracking for some years. Moreover, Economic Capital stretches Basel II-type risk profile by including other risks, such as migration and correlation risk, in addition to the default and concentration risk. The thesis analyzed all these risks in the Chapter 6 adopting a bottom-up approach, which requires the input of transaction terms and conditions as well as counterparty's PD, industry and country breakdown and transaction LGD. As a result, the Economic Capital model presented in Chapter 6 takes into account the economic realities of a bank's credit portfolio and adds layers such as inherent migration and correlation structures that may arise in the future time horizon. On the other hand, the thesis argued the shortcomings of alternate models of economic capital, including the top-down approaches that are easier to implement as they only require mean default rates and some macro-economic parameters, but they are unable to make specific analyses on individual exposures in the portfolio and lack considerably a robust correlation and migration framework due to data and model limitations. In fact, the model parameterization is the most difficult aspect of portfolio credit risk modeling, which is why many institutions worldwide decided to use Moody's KMV-developed models as they are based on extensive datasets and robust financial modeling. As a result, the thesis proposed the use of international best practice, the RiskFrontier, in the measurement of economic capital and portfolio credit risk.

Additionally, in Pillar 2, it is the banks' implementation and understanding of the models it uses that will determine the competitive advantage as well as capital requirements by the regulators. In that regard, banks should have a process to assess capital adequacy in relation to their risk profiles through board and senior management oversight, monitoring and reporting, which are all parts of a risk aware culture discussed in Chapter 5. A bank's senior management is responsible to understand the nature and level of risk and relate them to the overall capital requirements, which in consequence determine the bank's strategic business plan and risk appetite and identify the capital needs and sources of required capital. Economic capital is neither book nor market measure, thus further education, communication and effort of the board, senior management as well as individual business units are required for a Pillar 2 perspective of the new accord, in contrast to Basel I. Consequently, regulators want clear policies and procedures that identify measure and report the material risks inherent at the bank (including portfolio risks and other risks that are immeasurable, but manageable, e.g. strategic risks) and in line with the strategic and business objectives of the bank. This implies risk planning in conjunction with overall business planning.

Pillar 2 sits at the heart of regulators, key aims of financial stability and security through supervision. By differentiating between well risk-managed banks and others thorough capital relief or add-on capital, the message from the regulator will be clear to the market place and further disclosed to the market participants and external agencies through Pillar 3 reporting. The tasks for the banks will be to ensure that the new risk culture is reflected in the organization structures, bonus schemes, remuneration, budgeting and planning as well as educational initiatives in "the way we do business at the bank". It is apparent that Turkish financial institutions have disappointed their investors in the past, such as the 2000 and 2001 twin crisis due to the volatility of their earnings and the resulting losses, with respect to mainly credit related losses. By investment in risk management, a priceless opportunity is presented through Pillar 2 to the proactively risk-managed banks, if the regulators can link the lower capital requirements when banks can show that the risks are measured, managed and mitigated on a portfolio level with precise account of risk/return payouts. In this way, the market

participants are also given the opportunity to continually discount the poorly versus reward the well managed organizations where the overall financial stability can be restored through effective differentiation.

Basel I accord's limitation was that it took a "one-size-fits-all" type of approach to banking regulation such that capital requirements were overly high for risk-averse banks and dangerously low for banks with adventurous outlook, like many in Turkey before the twin crisis. The motivation with Basel II was to ensure that best practice risk management processes are in place that bank failures are left behind in the past as financial markets become more sound and safe. Stress-testing requirement under Pillar 2 sits at the heart of these discussions that it serves as a precautionary technique to counteract the credit cycle fluctuations and overall macro-economic fluctuations, which are considered as second order effects when developing models under Pillar 1 considerations. While the inclusion of macro-factors in PD and LGD estimates will be the wrong modeling approach[206], Pillar 2 stresses, nevertheless, that these second order effects should be accounted for in the risk management processes. Thus, banks need to adopt a stress-testing framework to bring these effects into the impact analysis when downturn occurs in a given asset class, industry, region and so on.

The impact of macro-economic shifts on the aggregated portfolio is much more tractable rather than trying to determine the impact on individual credit. In the systemic risk discussions in relevant chapters, the thesis argued that it is much more feasible to quantify the aggregated impact in a portfolio given a downturn condition, and then reflect on how individual credits relate to the collective. In fact, the R-squared measure in the Moody's KMV Global Asset Correlation model aims to quantify the systemic risks in the portfolio under 120 factors, then find out how individual transactions relate to a given system of common factors. Scenarios on correlation factors and correlated credit migrations under different market conditions will be the primal focus for the practitioner under Pillar 2 stress-testing regime.

7.6 Call for Market Discipline and Transparency: Pillar 3

Basel II is motivated to cover both sides of the coin, in terms of sustaining the safety and soundness of a financial system and the realization of the level playing field for the major players around the world. In particular, the objective of soundness of the financial system gained more importance since the summer 2007 in the financial markets worldwide. The latest credit crunch continues to suggest that in the new financial era, the emphasis will be extremely on successful implementation of Basel II. On the other hand, with much national discretions, a common level playing field still appears to be a difficult goal to achieve. Under so many "national discretions", Basel II seems incapable of providing an incentive on establishing a common ground for all players in the different parts of the world. In this respect, Pillar 3 disclosure requirements may help to establish the common ground as long as disclosures are relevant to the audience (equity and debt investors, external rating agencies, etc) and the audience, in turn, has the knowledge and background to make educated assessments.

206 Tony Hughes, "Portfolio Stress-testing", Moody's Economy.com, Regional Financial review, September 2007

Furthermore, as indicated in Chapter 3.4.4, "Fraudulent Banking Structures: Threats to the Financial Stability" and according to Frenkel (1999, p. 66), many of the problems stem from moral hazard[207]. Without any exception, the credit dynamics are the same everywhere. Since 2003 in Turkey, as markets were pumped with liquidity, financial intermediaries extended loans that were very risky. In many of the cases, the loans can be considered sub prime, for the purchasing of assets, such as real estate. The growing demand for such "assets" financed by the readily available credit lines, which are then refinanced by syndicated loans and securitized facilities, gave rise to the disproportionate increase of real estate prices. The existing "Zeit Geist" made both customers and lenders happy while real estate developers rushed into Turkey from the Gulf States and Europe hand-in-hand with investment bankers ready to "close deals". The shareholders of the banks, as a result, enjoyed the large asset value growth, which is just another bubble. Financial intermediaries, at the same time, experienced the collateral on the books go up in price until the first burst in the bubble took place.

As depicted in Figure 3.3, "Systemic Risk estimates in Turkey 1992-2006", the doubling of the R-squared in 2003 flashed the first signals of the turn-of-the-tide in Turkey. During this time, financial statements and asset values of the banking system were distorted, making it difficult to determine the "true and transparent" financial positions of the banks[208]. The collateral on the books of the financial institutions were also diminished. From the perspective of Basel II, an important issue arises such that under those circumstances, how one can determine the true "viability" of a bank, when figures are distorted during a crisis.

The determination of the viability is a critical aspect of Pillar 3. Under such circumstances, viability may be determined by examining two factors. First, the bank must develop a short to medium term plan that shows the capital adequacy and profitability situation of the bank under realistic macroeconomic assumptions.

Secondly, the position of the shareholders if and when the "business plans" do not succeed. In addition, the regulatory authorities must develop a view as to the future volume of banking activity that an economy under stressed conditions may absorb and signal certain criteria for sound banks for the evaluation by the market participants[209]. In this case, the role of the existence of supervisory data is important. The supervisory data may be outdated, so a process for collecting data based on uniform valuation criteria should be initiated. This is exactly the area where LGD assessment articles play a very big role of Basel II. In this sense, the supervisors should adapt uniform and transparent rules for keeping a strong market discipline that apply to all banks. Tasks at this stage include reinforcing the prudent and regulatory oversight and strengthening the transparency. In principle, market forces strengthened by the market disciplinary tools should determine the winners and losers among financial institutions.

207 Frenkel. J.: Remarks to Financial Crisis: What Have We Learned From Theory and Experience? 1999, pp. 66-67.

208 The Financial Stability Report of Central Bank of Turkey 2005 indicates a high level of provisions for that period.

209 IMF: Managing Systemic Banking Crisis, Occasional Paper 224, 2003,

7.7 The New Risk Management Organization: A Source of Competitive Advantage

With the Basel II accord, the risk management organization is expected to be a contributor of value, as opposed to its "policeman" role traditionally. The change requires considerably large investment in the design of the new organization, in particular in systems, data and models as well as in the systemization and centralization of the credit approval processes while keeping a de-centralized monitoring and control. Typically, Turkish banks recognize the need for the transition to the new risk management organization; however, the main inhibitor to this change has been the lack of transparency regarding the benefits from such change. As discussed in Chapter 5, this is an opportunity for Turkish banks to invest in changing risk management to improve the financial performance, without compromising prudence and regulation.

The main prerequisites for the successful implementation of the new organization structure are the good data, systems and models, of which the thesis proposed solutions in these domains in Chapter 6. Assuming that these are all in place at Turkish banks, the next step for banks is to make better use of information to improve efficiency and cut costs. Systemization as proposed in Chapter 5 lies at the heart of minimizing human intervention through maximizing the use of tools, which in turn reduce costs, improve efficiency through reduced reporting and credit approval layers and increase customer satisfaction at origination. The automation of a range of support processes, such as the data management, monitoring and control allows for the de-centralized processes at business unit level. With greater central control of improved data and systemization, the need for management by "credit committee" is reduced. Rather, they are distributed to the risk management industry desks. In turn, the performance tracking, planning and training can become more efficient as data and systems are centralized through reporting to the group risk functions, which are primarily geared towards setting risk strategy and managing the value added or destruction at bank's portfolio.

Evidence shows that the payback on the investment in the new risk organization can be many times the cost of the investment as experienced in many global banks. This is a great opportunity for Turkish Banks, but the challenge still lies in the data collection, changes in systems and processes, and the implementation of appropriate models, which may take years to build and create for a successful transition to the new organizational design of risk management. In any case, Turkish banks should start now to consider the implications of risk management organization design if they are aiming for the end-2009 Basel II deadline.

APPENDICES

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www.federalreserve.gov/generalinfo/basel 2/doubledefault.pdf

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- **Zuberbühler, D.:** Basel II für die Schweiz – Überblick. In: Seminar Basel II, Schweizerische Umsetzung auf der Zielgraden. Basel: EBK, September 2005.
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7. **Valiukenas, D. J.:** Writing with Authority – A Guide to the Research Process. New York: Random House, 1987.

Appendix II: Curriculum Vitae of the Author

Surname and Title	: Mr. BENLI
Other Names	: Vahit Ferhan
Nationality	: Turkey
Birthday	: 11/3/1966 (male), married
Address	: Tepecik Yolu. Geylani 2. Sitesi A Blok 11. 80 630 Etiler
City	: Istanbul
Phone (P)	: 0090-212-351 51 59
Phone (C)	: 0090-533- 377 11 99
Email	: ferhanbenli@hotmail.com

Type of Degree: Doctoral Study

Dates: WS 2003 – 2008 March completed.

Subject: Developing an efficient credit risk management and internal rating based (IRB Approach) system for Implementation of Basel II in Turkey. The project includes the usage of MoodysKMV rating and portfolio management tools as Basel II compliant implementation tools at turkish banks.

Graduate / Masters Degree

Place of Study: University of Zürich-Switzerland
Type of Degree: Master of Arts UZH / Cum Laude
Dates: winter semester 86- winter semester 92 (incl. bachelors education)
Subject: Banking and Finance
Language of Instruction: German & English
Thesis written in: Project Finance, Cash Flow Analysis, Management Development

Secondary Education

Place of Study: Istanbul Erkek Lisesi - Istanbul
Type of Degree: 7/10
Dates: Winter semester 78- summer semester 84
Language of Instruction: German

Primary Education

Place of Study: Primar Schule Zurlinden - Zürich
Type of Degree: Good
Dates: Winter semester 77- summer semester 78

I. Work Experience

1. Kiler Holding – CFO of the Group June 2008 - still working

My responsibility ranges from project finance facilities down to the arrangement of syndicated construction finance facilities for Sapphire, which is second tallest building in Europe. The range of finance also includes the IPO of the Group's Reit and the financing including modelling of the existing energy projects in the name of Kiler Group. Group's retail activities are also financed by the Holding company.

2. TOKI – The Governmental Agency of Housing Jan 2007 – still working

Chief Financial & Risk Advisor to the Board of Directors

Toki is the chief residential housing agency of the Government of Turkey. Being the largest player in the mortgage market, is also playing a huge role in financing the real estate development and construction market. My duty consists of analysing and managing the project and portfolio risks of the real estate development projects of TOKI.

3. Halic Leasing – A subsidiary of ILIC Kuveyt April 2006- Jan 2007

Acting General Manager – Member of the Credit Commitee, being responsible for:

- The Representation of the Company in Turkey
- Responsibility for Origination and Structuring Asset based Leasing and Private Equity transactions
- Syndication of the originated leasing facilities

Achievements:

Two Private Equity transactions combined with structuered leasing facilities concluded in the area of Logistics and Olive Oil Production. Existing bad debts worth USD 10 mln are restuctured under bankruptcy protection rules of Turkey. Arrangement of the financing of a green field cement factory project in Syria in favor of Güriş Construction.

4. Halkbank – Turkey Dec 2003 – April 2006

Executive Vice President for Financial Institutions
Member of the Executive Commitee of the Bank

Responsibility:

Responsible for the Origination of Syndicated Lending Facilities and the management of syndication related risks arising from Structured Finance, Project Finance and Trade Finance transactions. The duty included the management of foreign and domestic bank

relations, covering the analysis and defining bank risks as well. The range of risk responsibility was further extended up to affiliated and subsidiary companies of Halkbank consisting of 34 companies from different industries, 3 banks abroad and the financial services companies in Germany and Bahrain as well. The position included the Management of Key Bank Account Relationships domestically and internationally within Global Banking Operations.

Achievements:

Arrangement of Loan Syndications with Global Banks like Abn Amro, Deutsche Bank, Bayerische Hypo-Vereinsbank and Citibank as well. Several of the deals include the following transactions:

- Arrangement of USD 1.8 billion worth of **Tüpraş Deal** as Mandated Arranger besides Standard Bank London and other syndicate banks in Turkey. The Deal was chosen **as the best acquisition finance deal by the year 2006.**
- Arrangement of EUR 178 mln TAV **Ankara Esenboga Airport Finance** Project with Bayerische Hypo Vereins Bank. **The Deal was elected as the best project finance deal in 2005 by IFR.**
- **Volkswagen-Dogus Syndication** – EUR 140 mln Stand-By LG Facility with ABN Amro Bank, Deutsche, HSBC, ING Bank
- **Doğuş Otomotiv Syndication** – EUR 50 mln, Syndicated Term Facility with Abn Amro, Societe Generale, Koc Bank N.V.
- **TAV International Cairo Airport Project** – USD 35 mln Stand-By LG Facility, Mandated Lead Arranger, Arranged with Garanti Bank, C-Bank, Family Finance House and Egypt/Romanian Bank
- Arrangement of USD 350 mln, 8 years Real Estate Project Finance for Turkish Housing Agency **(TOKI)**, syndicated with Deutsche Bank, Standard Bank London and Halkbank
- **THY** Syndicated Loan Facility of USD 270 mln, Co-Arranger with USD 50 mln
- **Demir-Halk Bank** Syndication of USD 100 mln, Mandated Lead Manager with USD 7.5 mln
- Oil Trade Finance Facility of USD 125 mln, transacted on the behalf of **Tüpraş Oil Refinery**
- Ararngement of Structured Term Repo Facility for 15 years arranged with **Deutsche Bank** to solve the long term liquidity problem of Halkbank.
- **Demir Halk Bank N.V**. syndication of USD 100 mln, Lead Mandated Arranger with USD 7.5mln, one year pre-export finance facility.
- Financial advisor to the USD 6.5 billion worth of **Turk Telekom** privatisation deal of Saudi Oger / Eksim Dış Ticaret Group.
- Lead Arranger to the **TUV Turk-Doğuş- Akfen** vehicle inspection project worth of USD 850 mln (deal suspended).
- Arrangement of several energy related syndicated deals

- Restructuring Halkbank with IMF and the World Bank under Article IV programs.
- Management and control of bank risks at the domestic and international level.

- Management and restructuring of Financial Services Companies of Halkbank in seven different branches in Germany.
- Management of Subsidiary Companies of Halkbank including Financial and Non Financial Companies in Germany, Holland (DHB Bank), Hungry (Hungarian Volksbank), Turkmenistan (UGOB), Iran (rep office), Bahrain (Offshore Branch).
- Managing the merger with Pamukbank at FI level.
- Acquisiton of Insurance Companies (Birlik Sigorta &Birlik Hayat) and an Investment Company (Halk Yatırım) for Halkbank. Board Membership at the Bank's Insurance Company, Birlik Sigorta

5. Banking Regulatory and Supervisiory Agency (BDDK)

Credit Risk Management Advisor **June 2002 – Dec 2003**

Responsibility:

Development of a new Credit Risk Management and Supervision Concepts for the Turkish Regulatory Body BDDK after the financial crisis in Turkey.

Achievements:

Supervisory concept development for Credit Risk Management standards based on the forthcoming Basel II new regulatory regime. Analysis of the German Bafın's credit risk management regime (Mindestanforderungen an das Kreditwesen – MAK) and the Swiss regulatory and supervisory standards (EBK-Schwerpunktprüfung Kreditrisikomanagement) and their application to Turkish standards.

- Synthesis for the Enron's collapse and its consequences for the Banking System. Analysis of the Enron's business, financial and contingent risks based on the real credit proposals arranged by ABN AMRO Bank and the simulation of loan facility decision making to increase the credit risk analysis skills of the regulators.
- Asset Securitization Structures and Mechanics. Application of asset securitization to resolving of Non Performing Loan problems in Turkey.
- Rating and Regulatory Standard. How to approve the IRB Approach in Turkey.

6. Günay Construction Lmt. (Nato Constructor)

Project Finance Director **Dec. 2001 – June 2002**

Responsibility:

Establishment of Project Finance Department. Structuring project- and working capital facilities for the domestic and international construction projects. Arrangement of Bid- and Performance Bonds for the tenders. Developing project financing & cash flow models for the financial feasibilities of the projects and analysing the performance criterias (IRR) of the projects.

Achievements:

Management of the Project Finance Department, Arrangement of LGs and construction financing facilities for:

- ISKI (Municipality of Istanbul Water Administration) new pipeline projects (Arrangement of 5 year leasing facility for the water pipelines)
- **IGDAS (**Municipality of Istanbul Natural Gas Administration) new gas pipeline projects financing and leasing facilities
- **Conakry New Guniea Higway Construction** International Tender Bid Bonds
- **Jordan - Renewal of Bus Station Terminals** International Tender Bid Bonds
- **Sudan Khartoum Ring Road Project** – Bid & Performance Bonds
- Financial Feasibility Analysis of Brasov Airport Project

7. ABN AMRO BANK Leasing - Istanbul

Assistant Vice President **June 1999 – Dec 2001**

Achievements:

- Establishment of the Leasing strategy in line with the ABN AMRO Bank Head Quarter's business and country business plans. This included the ABN AMRO Bank's client portfolio needs as well as the origination of deal at the second-tier portfolio level
- Development of the Business from scratch up to a USD 40 million business portfolio.
- Managing Corporate Accounts
- Structuring financial & operational Leasing proposals in terms of risk and return, writing up credit proposals when needed.

8. WestLB - Istanbul

Manager Corporate Banking **June 1998 – June 1999**

Achievements:

Arrangement of Trade Finance and Forfaiting facilities for Turkish Banks.Arrangement and of Bank and Vakıf Bank Syndications, including the **Raks Asset Securitisation**. Arrangement of Bank money market and trade finance lines for domestic turkish banks.

9. ABN AMRO BANK - Istanbul

Account Manager at Corporate Banking Department **June 1996– June 1998**

Achievements:

- USD 20 mln, 5 years term Syndicated Acquisition Finance of UNO Bread Factory for Dogus Holding
- Arrangement of Dogus Holding Genoto DEM 10 mln L/G and ECA facilities.
- Structuring several working capital finance and export loan facilities for Corporates and Multinational Companies.
- Arrangement of credit facilities trough using credit risk default swaps in Russia in favor of Daimler-Crysler in Turkey.

- Arrangement of Berdan Tekstil IPO with capital markets group.

10. INTERBANK-Istanbul

Strategic- and Financial Planning Officer **January 1995-March 1996**

Achievements: **Monitoring and measurement of Treasury Transactions and Performance incl. Forwards/Swaps/FX. Development of systems for better Financial Reporting and Planning system of the Bank.**

11. KOCBANK-Istanbul

EDP Systems Business Analyst and Developer **June 1994 – January 1995**

Achievements: Development of Treasury Risk Management Systems & Transfer Systems Electronic Funds Transfer Systems (EFT). The EFT project was awarded as the best project solution.

II. Work Experience in Switzerland

1. Organisation:	Fachschule für Bankwirtschaft Zürich/Switzerland
Responsibility:	Swiss Money and Capital Markets Instructor
Dates:	January 1992– April 94
Achievements:	Money Markets Instruments course development for Reuters Zürich, which saved the company from a bankruptcy.
2. Organisation:	University Of Zürich – Handelswissenschaftliches Seminar
Responsibility:	Teaching Assistant for Management Accounting, Banking and Finance at the University of Zürich Switzerland
Dates:	January 1989– June 1990.
3. Organisation:	Management Development at the University of Zürich
Responsibility:	Project Assistant for Management Development
Dates:	13/8/1990 - 27/10/1990

III. Consulting Activities Organised

1. First Risk Management Convention in Turkey arranged with Almafinjaeger (Switzerland) and the University of Commerce – February 2002 (Istanbul)

2. Workshops for several banks (TEB, Tekfenbank, Garantibank) regarding Credit Risk Management (February 2002 Istanbul)

3. Seminar for BDDK about Asset Securitisation (February 2002 – Ankara)

4. Financial Consultancy for Ege Group in Ankara (March 2003). Preparation of a cash flow model for implant production project worth USD 6.1 million

5. Presentation for Swiss Regulatory Body in Bern Switzerland (May 2003)

6. Presentation at World Bank Conference about Pricing of Non Performing Loans (April 2004)

7. Presentation of Real Estate Finance for Caisse D'Epargne in Istanbul (April 2005)

8. Participation and Delegation of Halkbank at IMF, World Bank and IIF Meetings in Washington D.C. and in Ankara during the country oversight meetings.

I. IV. Teaching Activity

1. Lecturer at the University of Commerce Istanbul. Main teaching areas involve Corporate Banking, Marketing Financial Services and Credit Risk Management

2. Phd Program at the University of Zürich, Implementing Basel II at Public Banks in Turkey

3. Lecturer at the University of Kadir Has in Istanbul since February 2005. (Basel II and the Credit Risk Management)

4. Lecturer at the University of Marmara for the Summer Term 2004. (International Banking and Structured Products)

5. Lecturer at the University of Has in Istanbul (credit risk management and Basel II).

V. Special Skills

1. User of Moodys KMV Risk Analyst, KMV Portfolio Manager and Credit Rating and Analysis Tools.

2. User of Moodys KMV Portfolio Manager and Deal Analyser.

3. Basel II and CAD III related regulatory information.

4. Turkish Banking Law and related regulations with respect to debt and bankruptcy protection rules.

Appendix III: Declaration by the Author on any Breach of the Copyright Law

I hereby solemnly declare that the work presented in this thesis has been carried out by me, and has not been previously submitted to any other University, College or Organization for an academic qualification, certificate or degree.

The work I have presented does not breach any copyright, in particular the results of Quantitative Impact Study (QIS) for Halkbank and the details referring to the Moody's KMV suite of solutions.

I further undertake to indemnify the University against any loss or damage arising from breach of the foregoing obligations.

Signed by:

Student's full name: Vahit Ferhan Benli, Mr.

Immatriculation No: 86-715-372

Date: 05.02.2008

School/Faculty: University of Zürich – Swiss Banking Institute, Zürich Switzerland.

Appendix IV: Confirmation Letter by MKMV

Moody's | K·M·V

1st Floor, 12 Arthur Street,
London EC4R 9AB, United Kingdom

Tel: +44 (0) 20 7208 8300
Fax: +44 (0) 20 7208 8301

15th October, 2007

To: University of Zurich, Swiss Banking Institute, Platten Str. 14, Zurich, Switzerland

Dear Sir/Madam,

This is to confirm that Mr. Ferhan Benli visited our London offices from 23rd July 2007 to 27th July for a period of one week.

During this time, he attended a wide range of sessions to learn about our solutions in-depth and understand the Basel II implementation options available for financial institutions globally. He has conducted many interviews with our experts and relationship managers regarding global best practices in credit risk management and investigated possible implications of Basel II IRB approach on the Turkish banking sector.

In support of his thesis, Basel II IRB Implementation for Turkish banks, our Credit Risk Specialist Group members provided methodology papers, presentations and other supporting materials in the fields of:

1. Data Collection and Analysis Tools: RiskAnalyst™ | Data & Internal Rating Systems
2. Stand-alone Credit Risk Measures: CreditEdge & RiskCalc | Expected Default Frequency (EDF™)
3. Portfolio Credit Risk Measurement: RiskFrontier™ | Next Generation Credit Portfolio Management & Economic Capital

We hope that his time spent at our offices with our experts as well as the supporting documentation about our solutions will ensure success in his research. Please do not hesitate to contact me if you have any questions or concerns.

Yours sincerely,

Gavin Style
Senior Managing Director

Appendix V: CRD/Basel II Project Road Map Turkey

Main Subject	Subject	Sub-Topic	Related Activity	2005								2006												2007												2008												2009
				5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1
1.Infrastructure Formulation	1.1 Risk Management Formulation	1.1.1Credit Risk Management	1.1.1.1Designation of data sharing elements between banks related to credit risk Management																																													
			1.1.1.2 Disclosure of adjustments related to credit risk management for external opinions																																													
			1.1.1.3 Publishing adjustments related to credit risk management																																													
		1.1.2 Market Risk Management	1.1.2.1 Disclosure of adjustments related to evaluation of market risk models for opinions																																													
			1.1.2.2 Publishing adjustments related to evaluation of market risk models																																													
			1.1.2.3 Disclosure of adjustments related to market risk management for external opinions																																													
			1.1.2.4 Publishing adjustments related to market risk management																																													
		1.1.3Operational Risk Management	1.1.3.1 Designation of data sharing elements between banks related to operational risk management																																													
			1.1.3.2 Disclosure of adjustments related to operational risk management for external opinions																																													
			1.1.3.3 Publishing adjustments related to operational risk management																																													
		1.1.4 Interest Rate Risk Management	1.1.4.1 Disclosure of adjustments related to interest rate risk management for external opinions																																														
			1.1.4.2 Publishing adjustments related to interest rate risk management																																													
		1.1.5 Liquidity Risk Management	1.1.5.1 Disclosure of adjustments related to liquidity risk management for external opinions																																														
			1.1.5.2 Publishing adjustments related to Liquidity Risk Management																																													
	1.2 Rating Organizations		1.2.1 Disclosure of adjustments for external opinions related to rating organizations that will be considered within the context of Basel-II.																																													
			1.2.2 Publishing adjustments related to rating organizations that will be considered within the context of Basel-II.																																													
			1.2.3 Starting process for granting permission to rating organizations that will be considered within the context of Basel-II.																																													
	1.3 Internal Auditing		1.3.1 Publishing adjustments related to Internal Auditing																																													
	1.4 Corporate Governance		1.4.1 Publishing adjustments related to corporate governance																																													

	DATES SPECIFIED ON THE ROAD MAP
	WORKS COMPLETED ON THE DATE SPECIFIED ON THE ROAD MAP
	COMPLETION DATES OF DELAYED WORKS
	COMPLETION DATES OF WORKS PLANNED TO FINISH IN THE FUTURE

Main Subject	Subject	Sub-Topic	Related Activity	2005								2006												2007												2008												2009
				5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1
2. Adaptation to EU Capital Requirements Directive (CRD)	2.1. Standard Approaches		2.1.1 Disclosure of CRD/Basel-II to external opinions																																													
			2.1.2 Publishing CRD/Basel-II as capital adequacy arrangement																																												
			2.1.3 Starting CRD/Basel –II Calculations beside Basel –II (parallel practice)																																												
			2.1.4 CRD/Basel-II rules to come into force																																												
	2.2 Advanced Approaches		2.2.1 Designation of criterions related to the banks that will use IRB approach																																												
			2.2.2 Disclosure of adjustments related to IRB approaches to external opinions																																												
			2.2.3 Publishing adjustments related to IRM approaches																																												
			2.2.4 Disclosure of evaluation and approving internal rating systems process guide to public opinion.																																												
			2.2.5 Starting parallel practice in the banks that will use IRB approaches																																												
			2.2.6 Starting the process of permitting for IRB approaches.																																												
			2.2.7 Designation of criterions related to the banks that will use VAR model																																												
			2.2.8 Disclosure of evaluation and approving VAR models process guide to public opinion.																																												
			2.2.9 Starting parallel practice in the banks that will use market risk model in calculations of Legal Capital Obligation as mandatory.																																												
			2.2.10 Use of market risk model in calculations of legal capital obligations will be made compulsory for the banks within determined criterions.																																												
			2.2.11 Designation of criterions related to the banks which will use AMA approach.																																												
			2.2.12 Disclosure of adjustments related to AMA approaches to external opinions																																												
			2.2.13. Publishing adjustments related to AMA approaches.																																												
			2.2.14 Disclosure of evaluation and approving AMA approaches process guide to public opinion																																												
			2.2.15 Starting parallel practice in the banks that will use AMA approaches																																												
			2.2.16 Starting the process of permitting for the use of AMA approaches.																																												
	2.3 Second structural Block		2.3.1. Disclosure of sub- adjustments draft associated to relations between other country supervision authorities within the context of CRD\ Basel II																																												
			2.3.2 Publishing sub adjustments associated to relations between other country supervision authorities within the context of CRD\ Basel II																																												
			2.3.3 Projection and due diligence process for evaluation system of banks internal equity																																												
	2.4 Calibration		2.4.1 Starting calibrations studies for LGD and EAD rates for our country																																												
	2.5 Risk Based Provision Practice		2.5.1 Disclosure of Provision Legislation changes to external opinions																																												
			2.5.2 Publishing Provision legislation changes																																												
	2.6 Financial Reporting		2.6.1 Disclosure of relevant chapters of Accounting Practices Regulations to external opinions.																																												
			2.6.2 Publishing revised relevant chapters of Accounting Practices Regulations within the context of Basel II.																																												
	2.7.Supervision Reporting		2.7.1 Announcement of revised reports																																												

	DATES SPECIFIED ON THE ROAD MAP
	WORKS COMPLETED ON THE DATE SPECIFIED ON THE ROAD MAP
	COMPLETION DATES OF DELAYED WORKS
	COMPLETION DATES OF WORKS PLANNED TO FINISH IN THE FUTURE

Main Subject	Subject	Sub-Topic	Related Activity	2005								2006												2007												2008												2009
				5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1
3. Adaptation Process	3.1 Road Maps		3.1.1 Disclosure of Road Map to public opinion.																																													
			3.1.2Request for Banks' internal Road Maps regarding Basel II																																												
	3.2 Basel II Committees		3.2.1 Basel II Project Committee Meeting																																												
			3.2.2 Basel II Orientation Committee Meeting																																												
			3.2.3 Basel II Coordination Committee Meeting																																												
			3.2.4 Establishment of sub working groups in BDK structure																																												
			3.2.5 Establishment of sub working groups in BDDK (Banking Regulation and Supervision Agency) structure																																												
	3.3.Quantitative Impact Studies		3.3.1 Starting Second Local Quantitative Impact Studies (QIS-TR2) (including VAR, IRB and AMA)																																												
	3.4 Publications		3.4.1 Publishing Turkish translation of Basel – II (including November 2005 changes)																																												
	3.5 Progress Reports		3.5.1 Informing progress reports contents that will be requested from banks every six months																																												
			3.5.2 Sending progress reports that will be requested from banks every six months																																												
			3.5.3 Publishing evaluation report regarding progress reports that are requested from banks every six months																																												
	3.6 Communicating with other Departments		3.6.1 Starting instructive activities for non-financial sector about possible Basel-II impacts																																												
			3.6.2 Discussing other public bodies and Basel-II strategies																																												
			3.6.3 Starting preparations for symposium with extended participants																																												
			3.6.4 Organizing a symposium with extended participants regarding Basel-II																																												
	3.7 Training		3.7.1 Planning BDDK (Banking Regulation and Supervision Agency) training program																																												

	DATES SPECIFIED ON THE ROAD MAP
	WORKS COMPLETED ON THE DATE SPECIFIED ON THE ROAD MAP
	COMPLETION DATES OF DELAYED WORKS
	COMPLETION DATES OF WORKS PLANNED TO FINISH IN THE FUTURE

Appendix VI: Global Asset Correlation Factors

FACTOR CLASSIFICATIONS IN GLOBAL ASSET CORRELATION MODEL

GLOBAL EFFECT

1 Macro
2 Small Firm

REGIONAL EFFECT

1 Europe
2 North America
3 Japan
4 South East Asia
5 Australia/NZ

SECTOR EFFECT

1 Interest Sensitivity
2 Extraction
3 Non-Durables
4 Durables
5 Materials
6 High Technology
7 Medical

COUNTRY EFFECT

1 USA/CARIBBEAN
2 CANADA
3 DENMARK
4 GREECE/SOUTHEAST EUROPE
5 JAPAN
6 AUSTRALIA
7 INDONESIA/SOUTHEAST ASIA
8 CHINA
9 AUSTRIA
10 BELGIUM/LIECHTENSTEIN/LUXEMBOURG
11 SWITZERLAND
12 GERMANY
13 SPAIN
14 FRANCE
15 GREAT BRITAIN

16 HONG KONG
17 ITALY
18 MALAYSIA
19 NETHERLANDS
20 SINGAPORE
21 SWEDEN
22 THAILAND
23 SOUTH AFRICA
24 FINLAND
25 IRELAND
26 NORWAY
27 KOREA, REPUBLIC OF
28 NEW ZEALAND
29 NORTH AFRICA
30 CENTRAL AFRICA
31 FORMER USSR
32 EAST EUROPE
33 PACIFIC OCEAN ISLANDS
34 CENTRAL/SOUTH AMERICA
35 SOUTHERN SOUTH AMERICA
36 ISRAEL
37 TURKEY
38 PHILIPPINES
39 TAIWAN
40 INDIA
41 PAKISTAN
42 PORTUGAL
43 SOUTH ASIA
44 POLAND
45 MIDDLE EAST

INDUSTRY EFFECT

1 AEROSPACE & DEFENSE
2 AGRICULTURE
3 AIR TRANSPORTATION
4 APPAREL & SHOES
5 AUTOMOTIVE
6 BANKS AND S&LS
7 BROADCAST MEDIA
8 BUSINESS PRODUCTS WHSL
9 BUSINESS SERVICES
10 CHEMICALS
11 COMPUTER HARDWARE

12 COMPUTER SOFTWARE
13 CONSTRUCTION
14 CONSTRUCTION MATERIALS
15 CONSUMER DURABLES
16 CONSUMER DURABLES RETL/WHSL
17 CONSUMER PRODUCTS
18 CONSUMER PRODUCTS RETL/WHSL
19 CONSUMER SERVICES
20 ELECTRICAL EQUIPMENT
21 ELECTRONIC EQUIPMENT
22 ENTERTAINMENT & LEISURE
23 FINANCE COMPANIES
24 FINANCE NEC
25 FOOD & BEVERAGE
26 FOOD & BEVERAGE RETL/WHSL
27 FURNITURE & APPLIANCES
28 HOTELS & RESTAURANTS
29 INSURANCE - LIFE
30 INSURANCE - PROP/CAS/HEALTH
31 INVESTMENT MANAGEMENT
32 LESSORS
33 LUMBER & FORESTRY
34 MACHINERY & EQUIPMENT
35 MEASURE & TEST EQUIPMENT
36 MEDICAL EQUIPMENT
37 MEDICAL SERVICES
38 MINING
39 OIL REFINING
40 OIL, GAS & COAL EXPL/PROD
41 PAPER
42 PHARMACEUTICALS
43 PLASTIC & RUBBER
44 PRINTING
45 PUBLISHING
46 REAL ESTATE
47 REAL ESTATE INVESTMENT TRUSTS
48 SECURITY BROKERS & DEALERS
49 SEMICONDUCTORS
50 STEEL & METAL PRODUCTS
51 TELEPHONE
52 TEXTILES
53 TOBACCO
54 TRANSPORTATION EQUIPMENT

55 TRANSPORTATION
56 TRUCKING
57 UNASSIGNED
58 UTILITIES NEC
59 UTILITIES, ELECTRIC
60 UTILITIES, GAS
61 CABLE TELEVISION

120 TOTAL

Appendix VII: Example Data Details – For Commercial Entities

The fields below are requested by the Moody's KMV Credit Research Database Initiative as discussed in sub-section 6.4 of Chapter 6 with the highest priority fields shown in bold. Not all banks can provide all of the high priority fields on all of its customers. So some "Must Have" fields have been identified for the non financial statement chart of account data.

i. Customer Data

Customer data may be sourced from either financial statement database or loan systems.

Field	Description	Type	Must Have if Bank Matches and Detects Defaults
Company Name/Identifier	Name of company or a coded name; consistent throughout submitted data	Text	X
Financial Statement Database ID	ID for this company in financial statement database	Text	
Loan System ID	ID for this company in loan system	Text	
Fiscal Year End	Month & Date of company's fiscal year end	Date/Time	
State/Province	State or province in which company HQ are located	Text	X
Postal Code	Postal code of borrowing company	Text	
Country	Country of borrowing company	Text	X
Incorporation/Founding Date	Date company was incorporated or founded	Date/Time	
SIC	Standard Industrial Classification code	Text	X
NACE	General Name for Economic Activities in the European Union code	Text	X
Legal Form	Company legal form: Incorporated, Limited Liability Corporation, Partnership, Limited Liability Partnership, Sole Trader, Not For Profits, Trusts, etc.	Text	X
Parent Company or Subsidiary?		Text	
Public or Private Company?		Text	X

ii. Financial Statement (FS) Data

Field	Description	Type	Must Have if Bank Matches and Detects Defaults
Company Name/Identifier	Name of company or a coded name; consistent throughout submitted data	Text	X
Financial Statement Database ID	ID for this company in financial statement database	Text	
Balance Statement Date	Date of financial statement	Date/Time	X
Statement Year	Fiscal Year for this financial statement	Date/Time	
Months in statement	Number of months in financial statement	Number	X
Audit Quality	Audit, Unaudited, Tax Return, Compiled, Projection, etc	Text	X
Annual Statement?	Indicates if statement is annual or not	Yes/No	X
Units	Units used in financial statement, e.g. actual, thousands, etc	Text	X
Consolidated or Company Statement?		Text	X
Currency	Currency used in this financial statement	Text	X

iii. Balance Sheet:

A CALLED UP SHARE CAPITAL NOT PAID	Number
B FIXED ASSETS	Number
I Intangible assets	Number
1. Development costs	Number
2. Concessions, patents, licenses, trade marks and similar rights and assets	Number
3. Goodwill	Number
4. Payments on account	Number
II Tangible assets	Number
1. Land and Buildings	Number
2. Plant and machinery	Number
3. Fixtures, fittings, tools and equipment	Number
4. Payments on account and assets in course of construction	Number
II	Number
I Investments	
1. Shares in group undertakings	Number
2. Loans to group undertakings	Number

	3. Participating interests	Number
	4. Loans to undertakings in which the company has a participating interest	Number
	5. Other investments other than loans	Number
	6. Other loans	Number
	7. Own shares	Number
C	**CURRENT ASSETS**	Number
I	**Stocks**	Number
	1. Raw materials and consumables	Number
	2. Work in progress	Number
	3. Finished goods and goods for resale	Number
	4. Payments on account	Number
II	**Debtors**	Number
	1. Trade debtors	Number
	2. Amounts owed by group undertakings	Number
	3. Amounts owed by undertakings in which the company has a participating interest	Number
	4. Other debtors	Number
	5. Called up share capital not paid (A)	Number
	6. Prepayments and accrued income (D)	Number
II		Number
I	**Investments**	
	1. Shares in group undertakings	Number
	2. Own shares	Number
	3. Other investments	Number
I		Number
V	**Cash at bank and in hand**	
D	**PREPAYMENTS AND ACCRUED INCOME**	Number
	CREDITORS: AMOUNTS FALLING DUE WITHIN ONE	Number
E	**YEAR**	
	1. Debenture loans	Number
	2. Bank loans and overdrafts	Number
	3. Payments received on account	Number
	4. Trade creditors	Number
	5. Bills of exchange payable	Number
	6. Amounts owed to group undertakings	Number
	7. Amounts owed to undertakings in which the company has a participating interest	Number
	8. Other creditors including taxation and social security	Number
	9. Accruals and deferred income (J)	Number
F	**NET CURRENT ASSETS (LIABILITIES)**	Number
G	**TOTAL ASSETS LESS CURRENT LIABILITIES**	Number
	CREDITORS: AMOUNTS FALLING DUE AFTER MORE	Number
H	**THAN ONE YEAR**	
	1. Debenture loans	Number

	2. Bank loans and overdrafts	Number
	3. Payments received on account	Number
	4. Trade creditors	Number
	5. Bills of exchange payable	Number
	6. Amounts owed to group undertakings	Number
	7. Amounts owed to undertakings in which the company has a participating interest	Number
	8. Other creditors including taxation and social security	Number
	9. Accruals and deferred income (J)	Number
I	**PROVISIONS FOR LIABILITIES AND CHARGES**	Number
	1. Pensions and similar obligations	Number
	2. Taxation, including deferred taxation	Number
	3. Other provisions	Number
J	**ACCRUALS AND DEFERRED INCOME**	Number
K	**CAPITAL AND RESERVES**	Number
I	**Called up share capital**	Number
II	Share premium account	Number
II		Number
I	Revaluation reserve	
I		Number
V	Other reserves	
	1. Capital redemption reserve	Number
	2. Reserve for own shares	Number
	3. Reserves provided for by the articles of association	Number
	4. Other reserves	Number
V	**Profit and loss account**	Number

iv. Income Statement:

1.	**Turnover**	Number
2.	**Cost of Sales**	Number
3.	**Gross profit or loss**	Number
4.	**Distribution costs**	Number
5.	**Administrative expenses**	Number
	- Depreciation Expense	Number
	- Amortization Expense	Number
	- Exceptional Items	Number
6.	**Other operating income**	Number
	Operating profit or loss	Number
	Profits or losses on the sale or termination of an operation	Number
	Costs of a fundamental reorganization or restructuring	Number
	Profits or losses on the disposal of fixed assets	Number
7.	**Income from shares in group undertakings**	Number
8.	**Income from participating interests**	Number

9.	**Income from other fixed asset investments**	Number
10	**Other interest receivable and similar income**	Number
11	Amounts written off investments	Number
12	**Interest payable and similar charges**	Number
	Profit or loss on ordinary activities before taxation	Number
13	**Tax on profit or loss on ordinary activities**	Number
14	**Profit or loss on ordinary activities after taxation**	Number
15	*Minority interests*	Number
16	Extraordinary income	Number
17	Extraordinary charges	Number
18	**Extraordinary profit or loss**	Number
19	Tax on extraordinary profit or loss	Number
20	*Minority interests*	Number
21	Other taxes not shown under the above items	Number
22	**Profit or loss for the financial year**	Number

v. Loan Accounting System (LAS) Data

Field	Description	Type	Must Have if Bank Matches and Detects Defaults
Company Name/Identifier	Name of company or a coded name; consistent throughout submitted data	Text	X
Loan System ID	ID for this company in loan system, unique for any customer for any given source system business division identified next	Text	
Source System Identifier	A computerized accounting system identifier to indicate the data source of customer records.	Text	
Business Division Identifier	Code to identify business division where loan is housed	Text	
Loan Identifier	Code to identify loan facility	Text	
Commitment or Draw Record?	Whether this record reflects the overall commitment or an underlying draw	Text	
Draw ID	ID for this draw record, if applicable	Text	
Currency	Currency in which this facility is denominated	Text	
Participation Identifier	Code to identify if the loan has been participated out	Text	

Field	Description	Type	Must Have if Bank Matches and Detects Defaults
As Of Date	Date of facility information provided	Date/Time	
Loan Status	Active, Closed, Inactive, etc.	Text	
Loan Type	Term, line, letter of credit, commit etc.	Text	
Loan Purpose	Primary purpose of the loan	Text	
Loan Index	i.e. Prime, LIBOR, etc.	Text	
Loan Index Rate	Index rate at the As of date	Number	
Interest Rate	Loan's current interest rate	Number (decimal)	
Loan Spread	Interest rate pricing as a percentage over index (if available)	Number	
Origination Date	Date loan originated	Date/Time	
Origination Amount	Amount of originated loan	Number	
Renewal Date	Date loan was renewed	Date/Time	
Maturity Date	Date loan is to mature	Date/Time	
Customer Risk Rating	Assigned risk rating for this customer (preferably PD rating)	Text	
Facility Risk Rating	Assigned risk rating for this particular facility (preferably LGD rating)	Text	
Gross Commitment Amount	Total amount currently available through this facility, including any amounts outstanding and any amounts participated out to other financial institutions	Number	
Gross Balance Amount	Total amounts outstanding for this facility, including any amounts participated out to other financial institutions.	Number	
Net Commitment Amount	Gross Commitment Amount less any amounts participated out to other financial institutions	Number	
Net Balance Amount	Gross Balance Amount less any amounts participated out to other financial institutions	Number	
Default Date	Earliest date on which any default event occurred, if applicable	Date/Time	X
Default Type	Substandard, 90DaysPastDue, NonAccrual, Loss, TroubleDebtRestructure, Charge Off, Bankruptcy	Text	X

Field	Description	Type	Must Have if Bank Matches and Detects Defaults
Net Charge Off Amount	Cumulative amount of charge-offs on the financial books	Number	
Charge-off Date	Date of loan's first charge–off / write-down	Date/Time	
Non-accrual Indicator	Identifies if loan is currently on non-accrual status	Text	
Non-Accrual Date	Date loan was first put on non-accrual status	Date/Time	
Past Due Date	A scheduled payment date for which a principal and/or interest payment has not been made on time	Date/Time	
Past Due Days	Number of days that interest and or principal payment is currently past due the date above	Number	
Times 90 DPD	Number of separate instances where loan exceeded 90 days due	Number	
Collateral Type Code	Signifies the primary collateral type that secures the loan	Text	
Bankruptcy / Credit Protection	Indicates if a borrower is currently in Bankruptcy status	Text	
Bankruptcy Date	Date borrower entered bankruptcy	Date/Time	

vi. **Data Details – For Low Default Categories**

Categories and columns can be subject to change.

Category (Portfolio)	Obligors	New Obligor Defaults	Amount Committed	New Amount Defaulted
Local Authorities				
Higher Education				
Further Education				
Registered Social Landlords (Housing Associations)				
Large Scale Voluntary Transfers (Housing Associations)				
Private Finance Initiative				
Foundation Hospitals				
Non-Bank Financial Institutions (e.g. Insurance, Pensions funds)				
Fund managers, investment trusts, hedge funds etc.				
Banks				
Large PLCs (i.e. FTSE 100 - 250)				
Sovereign entities				

Default may take on a less severe meaning if needed to obtain statistics. For example, 30 days past due may be reported on.

vii. Exposure at Default according to Facility Type

Facility type	Committed	Uncommitted
Back to Back	95%	50%
Bridge Loan	95%	50%
Commercial	95%	50%
Contingent Exposure	95%	50%
Convertible Bond Arbitrage P.M.	95%	50%
Defeasance Structures	95%	50%
Factoring/Discounting	95%	50%
GTA Trade /LCs	25%	
GTA Trade Finance Products	25%	
GTA Trade Guarantees/SBLCs	25%	
General Banking	95%	50%
L/C Confirmation	25%	
Lease	25%	
Money Market/Short Term Loan	95%	50%
Other Guarantees/Bonds	95%	50%
Overdraft	95%	50%
Repo's	95%	50%
Revolving Credit	95%	50%
Securities Lending	95%	50%
Stand-by Letter of Credit	95%	50%
Stand-by Liquidity Facility	95%	50%
Subordinated Debt	95%	50%
Term Loan/Roll Over	95%	50%
Underwriting	95%	50%